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# XXXVI.—A REVIEW OF THE KNOWN PHILIPPINE ISLANDS SPECIES OF IMPATIENS.

J. D. Hooker.

The materials on which the following attempt to classify the known Philippine species of *Impatiens* is founded are the following :—

1, the published account of *I. Balsamina* in Blanco's Flora de Filipinas (1837) under the name of *I. triflora*, Blanco ;

2, the type specimen of *I. manillensis*, Walp. (1848), loaned to me by the good offices of the Keeper of the Royal Herbarium of Berlin ;

3, three species presented to the Kew Herbarium by Mr. Sebastian Vidal ;

4, ten species collected by Mr. A. Loher, a resident in Manila, and presented by him to Kew ;

5, a few species in the Herbarium of the Botanic Garden, New York, kindly loaned ;

6, herbaria made by various collectors (including Mr. Loher) subsequent to the occupation of the islands by the Government of the United States, brought together by Mr. Elmer D. Merrill* and kindly loaned to me for description, together with duplicate specimens of many presented to the Kew Herbarium. In this last collection the specimens are for the most part carefully numbered and ticketed as to locality and collector's name ; they do not together form part of a single Government Herbarium, but belong to various Government departments. It hence appears necessary when citing a number to add the name of the Herbarium in which the corresponding species is to be found. The Herbaria are designated as follows :—

Herbarium of the Bureau of Science.
" " Government Laboratories.
" " Exploration of the Philippines.
" " Philippine Exposition Board.
" " Philippine Normal School.
" " San Fernando Provincial High School.

* Mr. Merrill is author of many papers on the Flora of the Philippine Islands, of which thirty-one, dating from 1903, are recorded in the library of the Herbarium of the Royal Botanic Gardens.

(13890—6a.) Wt. 108-471. 1375. 8/09. D & S.

The Bureau of Science herbarium is by far the richest in numbered species (about 20); it is followed by that of the Government Laboratories (about 10); the remainder are insignificant.

With regard to the classification of the species which I have adopted, it is obvious that *I. Loheri*, the single species with pedunculate inflorescence and alternate leaves, widely differs from all the rest; as does *I. Balsamina* by its alternate leaves from all others with simply pedicelled flowers. The division of the remainder into those with normal and those with exclusively cleistogamous flowers is forced upon me by the fact that I cannot identify the two species thus characterized with any of those bearing normal flowers; it remains for a local botanist to clear up their history. Of the species with opposite lower and whorled upper leaves, *I. polyactina* alone is remarkable for the number of whorls placed at regular intervals on its elongated stem and the almost complete suppression of opposite leaves; it is a near ally of the Javan *I. cyclocoma*, Miq.; it does not occur in any of the Government herbaria, only in that of the New York Botanic Garden. The subsection of species with subulate inter- or infra-petiolar glands is not a very satisfactory one, these being variable in number and position on the plant and not absolutely confined to the subsection. Of the floral organs the two lateral sepals are the most constant in size and form, but they do not afford sectional characters. The vexillum varies greatly in form in individual species, even from orbicular to oblately cuneiform and truncate; in some the costa is dorsally more or less thickened below the middle. I have adopted the remarkably deep sinus in the apex of the lobes of the wings, which is very conspicuous in some species, as a subsectional character; but it is a very unsatisfactory one. The labellum is long spurred in all the verticillate-leaved species, the spur varying in length. The androecium is uniform throughout the verticillate-leaved species; it is very short, with the orbicular anthers connate by broad connectives and these with the very short subulate filaments into a ring with the anther cells introrse.

This is characteristic of a large proportion of the Malayan Archipelago species of *Impatiens*, of which *I. platyphylla*, Lindl. is the type, and which extends from Sumatra *via* Java, Borneo, the Celebes, and the Moluccas eastward to New Guinea and northward to the Philippines. *I. Loheri*, on the other hand, has long, broad filaments, and anthers with the connective produced into an appendage, a very different structure from the acute or acuminate anther of many Chinese and Indian species. The capsule in the whorled-leaved species is turgid and more or less gibbous in the middle, narrowed to both ends, polyspermous; the seeds are very small and usually more or less pubescent. In *I. Balsamina* the capsules are oblong, rounded at both ends, with many globose, naked seeds; in *I. Loheri* the capsule is straight, narrowed at both ends, with many glabrous seeds.

I have been led into detail on the organs of these Philippine Balsams from consideration of the great obstacles I have found in attempting to classify them, and the conviction that it is only by the study of living specimens that these and other difficulties will be overcome. In no genus of flowering plants known to me is the difficulty

of analysing herbarium specimens so great; the flowers must be moistened, dismembered under water on the stage of the microscope, and the organs laid out with every fold and wrinkle flattened; these should then be secured on slips of gummed paper and placed beside the specimen in the herbarium. In the field the specimens should be at once placed between sheets of absorbent paper in a portfolio along with dismembered flowers. I need hardly say that our knowledge of the genus as it occurs in the Philippines is hardly even elementary; the few recorded species are with few exceptions from Luzon alone, and I cannot doubt but that when the mountains of the Archipelago are further botanically explored the genus *Impatiens* will be found to be largely represented.

### Clavis Specierum.

A. Inflorescentia simpliciter pedicellata :—
  Folia omnia alterna :—
    Folia serrata; capsula tomentosa. 1. *I. Balsamina*, L.
  Folia inferiora opposita, superiora 3–14-natim verticillata :—
    Flores normales :—
      Folia fere omnia 3–10-natim verticillata; verticilli perplurimi, caule elongato seriatim dispositi; folia lanceolata. 2. *I. polyactina*, Hk. f.
      Folia superiora tantum verticillata :—
        Verticilli superiores basi glandulis inter- vel infra-petiolaribus setaceis raro pulvinatis aucti (vide etiam *I. Klemmeana*, Hk. f.) :—
          Folia subtus glaucescentia vel albescentia :—
            Folia 6–15 cm. longa, ovato-lanceolata, spinuloso-serrulata, utrinque 6–8-nervia; flores 5–7 cm. expansi; sepala lanceolata, 8–10 mm. longa. 3. *I. Burkei*, Hk. f.
            Folia 8–15 cm. longa, ovata vel oblongo-lanceolata, subintegerrima, utrinque 5–7-nervia; flores 4–5 cm. expansi; sepala ovata, 4–5 mm. longa. 4. *I. Merrillii*, Hk. f.
            Folia 6–10 cm. longa, ovata, basi longe ciliata, utrinque 7–9-nervia; flores 2–2·3 cm. expansi; sepala lanceolata, 8–10 mm. longa. 5. *I. Hutchinsoni*, Hk. f.
            Folia 10–13 cm. longa, longe petiolata, oblonga, crenulata setulis interjectis, utrinque 7–9-nervia; flores ad 2 cm. expansi; sepala lineari-lanceolata, 12–14 mm. longa. 6. *I. Clemensae*, Hk. f.
            Folia 5–8 cm. longa, longe petiolata, ovato-oblonga, subcrenulata setulis interjectis, utrinque 5–6-nervia; flores ad 2 cm. expansi; sepala ovata, 6–7 mm. longa. 7. *I. biganensis*, Hk. f.
          Folia concoloria :—
            Folia 3–7 cm. longa, ovata vel ovato-lanceolata, fere integerrima, utrinque 5–6-nervia; glandulae interpetiolares capillares; flores 2–2·5 cm. expansi; sepala late ovata, longe pilosa, 5–7 mm. longa. 8. *I. caviteana*, Hk. f.

Verticilli basi eglandulosi, raro pauciglandulosi :—
Alarum lobi profunde vel late bifidi :—
Folia coriacea, argute spinuloso-serrata :—
Folia 5–6 cm. longa, ovato-lanceolata ; sepala 8–10 mm. longa, ovato-lanceolata ; semina 2·5 mm. longa, glabra. 9. *I. Elmeri*, Hk. f.
Folia membranacea vel papyracea, obscure serrulata, crenulata vel fere integerrima :—
Folia 6–15 cm. longa, oblonga vel ovato-lanceolata, utrinque 5–7-nervia ; sepala 6–7 mm. longa, ovato-lanceolata ; semina 4 mm. longa, hirsuta.
10. *I. manillensis*, Walp.
Folia pleraque 5–7-natim verticillata, 4–12 cm. longa, ovato-lanceolata, serrulata, utrinque 7–8-nervia ; sepala 7–9 mm. longa, ovata ; semina 2–3 mm. longa, puberula.
11. *I. quercetorum*, Hk. f.
Folia pleraque 3–5-natim verticillata, subsessilia, 3–6 cm. longa, lanceolata, superiora ciliata, utrinque 3–5-nervia ; sepala 7 mm. longa, ovata, glabra ; semina 3 mm. longa, hirsuta.
12. *I. Klemmeana*, Hk. f.
Folia superiora 5–7-natim verticillata, 3–8 cm. longa, subsessilia, lanceolata, ciliata, utrinque 5-nervia ; sepala 10 mm. longa, ovata, tomentosa ; semina 1·5–2 mm. longa, hirsuta et quasi pilis arillata. 13. *I. pubisepala*, Hk. f.
Alarum lobi apice rotundati, intrusi vel obcordati :—
Folia firma, argute serrulata :—
Folia 3–5 cm. longa, ovata, utrinque 5–6-nervia ; sepala ovato-lanceolata, 9 mm. longa, longe cuspidata. 14. *I. Mearnsii*, Hk. f.
Folia 2–3 cm. longa, pleraque ternatim verticillata, ovato-lanceolata, nervis utrinque 4 ; sepala ovato-rotundata, 5 mm. longa.
15. *I. Vidalii*, Hk. f.
Folia 2–5 cm. longa, pleraque 3–4-natim verticillata, nervis utrinque 4–5 ; sepala ovata, 6–7 mm. longa. 16. *I. Barnesii*, Hk. f.
Folia membranacea vel papyracea, integerrima vel obscure crenulata ; semina 2–2·5 mm. longa, pilosa :—
Caulis firmus, gracilis vel sat robustus :—
Folia pleraque opposita, 2–5 cm. longa, ovata, fere integerrima, utrinque 3–4-nervia ; flores parvi ; sepala ovato-lanceolata, 5 mm. longa. 17. *I. rizaliana*, Hk. f.
Folia pleraque opposita, 4–10 cm. longa, ovato-lanceolata, tenuiter membranacea, fere integerrima, utrinque 5–6-nervia ; flores 2·5 cm. expansi ; sepala ovata, 5–7 mm. longa. 18. *I. Ahernii*, Hk. f.

Folia pleraque verticillata, subsessilia, 4–8 cm. longa, lanceolata, utrinque 4–5-nervia, superiora saepe ciliata ; flores 2·5 cm. expansi ; sepala ovata, 6–7 mm. longa ; semina 3·5–4 mm. longa.

19. *I. montalbana*, Hk. f.

Caulis crassus, succosus, ramis flaccidis :—

Folia pleraque opposita, longe petiolata, 4–10 cm. longa, ovata vel oblonga, tenuissime membranacea, utrinque 4–8-nervia ; sepala ovata, 5–6 mm. longa.

20. *I. Ramosi*, Hk. f.

Caulis filiformis ; folia fere omnia opposita :—

Caulis simplex, erectus, gracillimus ; folia 5–10 cm. longa, lanceolata, utrinque 4–6-nervia ; sepala ovata, 6–7 mm. longa, cuspidata, glabra. 21. *I. filicaulis*, Hk. f.

Caulis vage ramosus ; folia 3–7 cm. longa, ovata, utrinque 4–5-nervia ; sepala ovata, 4 mm. longa, pilosa.

22. *I. Currani*, Hk. f.

Flores omnes cleistogami, minimi ; perianthii foliola deformia, plus minusve cohaerentia.—Herbae succosae ? erectae, ramosae, ramis gracilibus suberectis foliosis ; folia longe graciliter petiolata, 4–8 cm. longa, ovata vel ovato-lanceolata, integerrima vel crenulata ; pedicelli capillares :—

Labellum ecalcaratum ; capsula 7 mm. longa, uno latere turgida, utrinque acuta, 5-gona ; semina pauca, 2·5 mm. longa, obovoidea, compressa, laevia.

23. *I. cryptogama*, Hk. f.

Labellum calcaratum ; capsula 7–8 mm. longa, ellipsoidea, utrinque acuta, monosperma ? ; semina 3·3 mm. longa, obovoidea, compressa, puberula.

24. *I. cleistogama*, Hk. f.

B. Inflorescentia pedunculata :—

Herba elata, ramosa, glaberrima, macrantha ; folia alterna, petiolata, 8–12 cm. longa, ovata vel lanceolata, acuminata, crenato-serrata vel serrata, utrinque 7–9-nervia ; pedunculi foliis breviores, pauciflori ; sepala 2, late ovata, acuminata, 10 mm. longa ; vexillum dorso infra apicem rostratum ; alarum lobi ampli ; labellum poculiforme, basi rotundatum, in calcar breve attenuatum, ore horizontali acuto ; filamenta lata ; antherae didymae, appendiculatae.

25. *I. Loheri*, Hk. f.

## Localities, Observations, &c.

1. **I. Balsamina**, Linn.—*Merrill* in Herb. Bur. Govt. Labs. n. 27 (1905). *I. triflora*, Blanco, Fl. Filipp. 636, non Wilid.

Luzon : prov. Tayabas, *H. N. Whitford*, Herb. Govt. Labs. n. 550 ; Paco. *Lucile Nunez* in Herb. Norm. School, n. 168.

Forma caule simplice erecto folioso et multifloro ; folia angusta ; labelli calcar limbum subaequans.

A common tropical form. A cultivated form, found as an escape, with the lobes of the wings subequal, stipitate and orbicular (forma *diplocycla*, nob) is in Herb. Bur. Sc., *Felicidad Nera*, and from the island of Panay, *Vidal*, n. 2238 in Herb. Kew; in Herb. Bur. Sc. n. 6087 there is an impoverished state collected in the province of Laguna by C. S. Robinson.

2. I. polyactina, Hk. f.

Luzon bor.; Mt. Kiao, prov. Benguet, *R. S. Williams* in Herb. Hort. Bot. Nov. Eborac. n. 2012.

A remarkable species with long slender stems, divaricate branches, long and narrow leaves 2–3 cm. long. Its only near ally is the Javanese *I. cyclocoma*, Miq.—Not in Herb. Kew.

3. I. Burkei, Hk. f.

Mindanao; *D. Burke* n. 1882, ex exempl. in Hort. Veitch cult.; Hort. Kew, 1897; Mt. Apo, alt. 200 m., distr. Davao, *De Vore et Hoover* in Herb. Philipp. Expos. Board n. 366; Mt. Halcon, alt. 1300 m., Mindoro, *M. L. Merritt* in Herb. Bur. Sc. n. 4391; *R. S. Williams* in Herb. Hort. Bot. Eborac. n. 3032, 2587.

The largest flowered Philippine Island species.

4. I. Merrillii, Hk. f.

Luzon; prov. Rizal, *A. Loher*, n. 6768.

Closely allied to *I. Burkei*, but smaller flowered and readily distinguished by the small sepals.

5. I. Hutchinsoni, Hk. f.

Mindanao; Mt. Malingdang, prov. Misamis, *Major Mearns et W. J. Hutchinson* in Herb. Bur. Sc. n. 4564.

6. I. Clemensae, Hk. f.

Mindanao; Lacus Lanas, Camp Keithley, alt. 750 m., *Mrs. Mary Strong Clemens* in Herb. Bur. Govt. Labs. n. 201.

7. I. biganensis, Hk. f.

Luzon; Cerro Bigan, Montalban, *A. Loher*, n. 1650 in Herb. Kew.

8. I. caviteana, Hk. f.

Luzon; Maragondon, prov. Cavite, *E. D. Merrill* in Herb. Bur. Govt. Labs. n. 4179.

9. I. Elmeri, Hk. f.

Luzon; Panai, prov. Benguet, sylvis alt. 2000 m., *E. D. Merrill* in Herb. Bur. Sc. n. 4705—Not in Herb. Kew.

10. I. manillensis, Walp. in Nov. Act. Nat. Cur. xix. suppl. (1843) 317; Walp. Rep. Bot. v. 382—*see* Appendix.

Luzon; Jala jala, *Meyen* in Mus. Bot. Berol.—Not in Herb. Kew.

I have carefully examined the type specimen of this plant kindly lent to me by the Berlin Museum authorities, and give in an appendix to this treatise a full description of it. When the allied species here enumerated are better known, it is probable that one or more may be referable to *I. manillensis* or to forms of it.

11. I. quercetorum, Hk. f.

Luzon; prov. Benguet, *Loher*, n. 1651 in Herb. Kew; Mt. Panai, quercetis alt. 2100 m., *Major E. A. Mearns* in Herb. Bur. Sc. n. 4417, 4360, 4381.

12. I. Klemmeana, Hk. f.

Luzon ; distr. Lepanto, rupibus alt. 1500 m., *W. Klemme* in Herb. Bur. Sc. n. 5688 ; flum. Bued, prov. Benguet, *E. D. Merrill* in Herb. Bur. Sc. n. 4301.

A very handsome slender species of branching habit, with fascicles of pedicelled flowers from the upper leaf-whorls. On an accompanying ticket is inscribed "Nov. 11,06, Cervantes Lilidan (Igo), 1500 m. on rocks in open." Closely allied to *I. montalbana*, but leaves nearly sessile and wing-lobes deeply cleft.

13. I. pubisepala, Hk. f.

Luzon centr. ; Cueva de Montalban, *A. Loher*, n. 1652 partim in Herb. Kew.

A single specimen ticketed as having been collected in the same locality and on the same day as *I. montalbana*, and bearing the same number, but a very different plant with flowers twice as large, 2·5 cm. long, broader and more deeply lobed wings, and hairy sepals 10 mm. long ; the seeds are much smaller. The foliage is alike in both.

14. I. Mearnsii, Hk. f.

Luzon ; prov. Benguet, *Major E. A. Mearns* in Herb. Bur. Sc. n. 3416—Not in Herb Kew.

I have seen but one specimen ; it is remarkable for its very stout stem and densely branched habit ; in its small serrulate leaves it resembles *I. Barnesii* which has fewer nerves in the leaves, and has smaller ovate sepals. It may, however, prove to be a very largely developed state of that plant. The fruit of both is unknown.

15. I. Vidalii, Hk. f.

Ins. Panay ; Miagas, *Seb. Vidal*, n. 2245 in Herb. Kew.

A stout much branched low herb (or undershrub ?) with coriaceous recurved leaves. Fruit unknown.

16. I. Barnesii, Hk. f.

Luzon ; Baguio, prov. Benguet, rupibus calcareis alt. 1350 m., *A. D. Elmer* in Herb. Bur. Govt. Labs. n. 6065, et *P. Barnes*, n. 954.

17. I. rizaliana, Hk. f.

Luzon ; Montalban, prov. Rizal, rupibus calcareis, *E. D. Merrill* in Herb. Bur. Sc. n. 6234.

18. I. Ahernii, Hk. f.

Luzon ; Cayntang, Bosoboso, prov. Rizal, *Ahern* in Herb. Bur. Govt. Labs. n. 3367.

Mr. Merrill is disposed to regard this plant as *I. manillensis*, Walp. which has deeply cleft wing-lobes and is a much larger and broader leaved plant ; flowers about 2–2·5 cm. across.

19. I. montalbana, Hk. f.

Luzon ; Cueva de Montalban, *A. Loher*, n. 1652 in Herb. Kew ; rupibus calcareis, *E. D. Merrill*, in Herb. Bur. Sc. n. 6235.

Closely resembles *I. Klemmeana*, q.v.

20. I. Ramosi, Hk. f.

Luzon ; Bosoboso, prov. Rizal, *Maximo Ramos* in Herb. Bur. Sc. n. 4573, 4672.

Varies greatly in the succulence of the stem and in the size and number of nerves in the leaves.

21. I. filicaulis, Hk. f.

Luzon ; Montalban, *A. Loher*, n. 6763, 6764.

Stem 8–15 cm. high, filiform ; leaves narrowed into capillary petioles 1–3 cm. long, entire or minutely ciliate or serrulate ; pedicels much shorter than the leaves ; flowers 1·5–2 cm. broad, purple ; vexillum orbicular or cuneiform, costa dorsally keeled below ; lip scaphiform, acuminate, ascending ; spur 2·5 cm. long, very slender. Filaments minute. Capsule 9 mm. long, narrow, erect, turgid in the middle, narrowed to both ends, few-seeded. Seeds 2 mm. long, narrowly pyriform, compressed, hirsute, pale chesnut-brown.

22. I. Curranii, Hk. f.

Luzon ; prov. Cavite et Batangas, *H. M. Curran* in Herb. Bur. Govt. Labs. n. 7674.

A very slender flaccid diffusely branched herb with broader leaves than *I. filicaulis*, and hairy sepals, much smaller flowers and a turgidly gibbous many-seeded capsule ; seeds 2–2·5 mm. long, hispidulous.

23. I. cryptogama, Hk. f.

Luzon ; Montalban, prov. Rizal, *A. Loher*, n. 6752 in Herb Kew.

This and the following species are erect, much branched, probably more or less succulent herbs 3–4 dm. high, with in the dried state, dull green subtranslucent leaves and very few minute cleistogamous flowers and few-seeded capsules. Owing to the scarcity of flowers and shrivelled condition of the perianth segments I am very doubtful of the accuracy of my description. A careful search should be made for normal flowers of both species.

24. I. cleistogama, Hk. f.

Luzon ; Montalban, prov. Rizal, *A. Loher*, n. 6780 in Herb. Kew.

(*See* remarks under the preceding.)

25. I. Loheri, Hk. f.

Luzon ; Benguet, *A. Loher*, n. 1647 ; Mt. Data, alt. 2100 m., Lepanto, *E. D. Merrill*, in Herb. Bur. Sc. n. 4547.

A very handsome plant, 3–4 ft. high, with an apparently simple branched slender stem ; peduncles shorter than the leaves ; flowers 3–4 cm. broad, "pink, throat yellow, petals with many small purplish spots inside" (E. D. Merrill). Capsule 2·5 cm. long, linear-clavate, straight, acute, many-seeded ; seeds oblong, 3–3·5 cm. long.

### Species indeterminatae.

Herb. Bur. Sc. n. 4672 "*I. manillensis*, Walp., Bosoboso, prov. Rizal, Luzon."—Certainly not Walper's plant ; it is remarkable for the uppermost leaves on the branchlets often being alternate ; habit and foliage of *I. caviteana*, but leaves opposite almost throughout the plant.

A. Loher, n. 1648, in Herb. Kew, from Payon, Benguet :—a very small species with opposite ovate leaves, minute flowers, ovate hairy sepals and a very shortly spurred lip.

A. Loher, n. 1649, in Herb. Kew "*I. radicans*, Bl., Cueva de Montalban"—not Blume's *I. radicans*; specimen in bad condition, resembles *I. Hutchinsoni* but wants interpetiolar glands.

Seb. Vidal, n. 2246, in Herb. Kew "Island of Panay"—a fragment resembling *I. montalbana*.

### Appendix.

I. manillensis, Walp. in Nov. Act. Nat. Cur. xix. Suppl. (1848) 317; Walp. Rep. Bot. v. 382.

Ins Philipp. Manila, ad Jala jala, *Meyen* 8/31 in Mus. Bot. Berol.

*Herba* flaccida, glaberrima; caule erecto gracili ramoso. *Folia* 6–15 cm. longa, petiolata, inferiora opposita, superiora 3–5-natim verticillata, tenuiter membranacea, elliptica vel ovato-lanceolata, longe acuminata, subserrulata vel crenulata setulis minimis interjectis, subtus pallidiora, basi in petiolum 1–4 cm. longum angustata, nervis utrinque 5–7 gracillimis; glandulae stipulares 0. *Pedicelli* axillares, solitarii, 3–4 cm. longi, filiformes, ebracteati, fructiferi elongati. *Flores* 3–4 cm. lati, lilacini. *Sepala* 2, 6–7 mm. longa, ovato-lanceolata, longe acuminata, membranacea, oligoneura. *Vexillum* orbiculare, ad 14 cm. diam. *Alae* sessiles, ad 1·8 cm. longae; lobi apice dilatati intrusi vel bilobulati, lobulis inaequalibus divaricatis sinu saepe setifero; lobus basalis distali brevior et angustior; auricula dorsalis 0. *Labelli* limbus parvus, sepalis paullo longior, cymbiformis, ascendens, ore acuto; calcar 2·5–3 cm. longum, gracillimum, rectum vel incurvum. *Filamenta* brevissima; antherae connatae, obtusae. *Ovarium* rectum, acutum. *Capsula* 15 mm. longa, elliptica, utrinque attenuata, gibba, oligosperma. *Semina* anguste oblonga, 4 mm. longa, hirsuta.

Described from Meyen's type specimens in the Berlin Herbarium. The description by Walpers is incomplete, and the lower leaves are erroneously described as verticillate, and the upper as opposite; the petals (wings) are simply stated to be profundly bifid; the vexillum is not alluded to, nor are the capsules and seeds; the leaves are described as being glaucous beneath, but their undersurface is hardly paler than the upper. The perfectly glabrous, very membranous leaves and hirsute seeds are characteristic of *I. manillensis*.

In the Repertorium Walpers adds to the description in Nov. Act. "in vivo succulenta?"

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## XXXVII.—TOOWOOMBA CANARY GRASS.

(*Phalaris bulbosa*, Linn. = *P. commutata*, auct., non R. & S.)

Otto Stapf.

In the *Kew Bulletin* No. 2 of the present year (p. 79) an abstract was given of an account of a new fodder grass, "Phalaris commutata," which has recently been introduced into Australia and South Africa. In connection with it, it was pointed out that some difficulty exists as to what this plant "Phalaris commutata" may

be. Since then an article on the grass by Dr. Ewart, Government Botanist and Professor of Botany at the Melbourne University, in The Journal of the Department of Agriculture of Victoria, December, 1908, has reached Kew. In this article the author deals with the history and the hypothetical origin of the plant, and he also states that Professor Hackel, to whom specimens had been submitted, considered the grass "to be a new undescribed species intermediate between *Phalaris bulbosa*, L., and *Phalaris arundinacea*, L." A specimen of the grass was received at Kew from Professor Ewart in 1908, and it was then named *Phalaris bulbosa*, L. Further material has come to hand quite recently from Mr. J. H. Maiden, Sydney, and Mr. J. Medley Wood, Durban, and it is now possible to deal with the matter more fully.

The history of the grass is briefly as follows :—

About four or five years ago, Mr. Charles Ross, manager of the State Farm, Westbrook, Queensland, distributed in Australia a grass which was thought very likely to develop into a first-class fodder grass. It had been found by Mr. R. Harding, curator of the Toowoomba Botanic Gardens, Queensland, in out of the way places, such as hedgerows and rubbish heaps, in the gardens in his charge, and was assumed to be one of about 60 grasses received by his predecessor, the late Mr. Way, from the Agricultural Department of New York, U.S.A., in 1884. It is stated that since none of them were doing any good, on account of great drought, they were thrown away on a rubbish heap and lost with the exception of the one just mentioned. Subsequently further material was distributed from the Toowoomba gardens, and in 1906 it was already under trial on the Biggenden State Farm, Queensland (*Queensland Agric. Journ.* xvi., 394) and on the Bathurst Experimental Farm, New South Wales (*Agric. Gaz. N.S. W.* xviii., 700); it was at the same time recorded as doing very well in Gippsland, Victoria (*Journ. Dep. Agric. West Austr.* xiii., 381), and was in the same year exhibited at the September show of the Royal Agricultural Society at Adelaide (*Journ. Dep. Agric. South Austr.* x., 690). It soon acquired the reputation of being an excellent drought-resisting winter grass, and, in 1907, was on that account introduced into Natal (*Natal Agric. Journ.* xi., 1436).

The grass appeared in the Australian agricultural literature from the beginning as "Phalaris commutata," but it is not quite clear who is responsible for the name. There is very little doubt that it was meant to be a new name, although there is a *Phalaris commutata* on record, described by Roemer & Schultes (*Syst.* vol. 4, p. 403) as early as 1817. This is, however, a very dubious species, which was dropped long ago, and could hardly have been intended by whomsoever the name "P. commutata" was given to the Toowoomba grass. According to Bertoloni (*Fl. Ital. I.*, 343 ; see also *Parlatore*, *Fl. Ital. I.*, 70), the specimen from which Roemer & Schultes described their *P. commutata* consisted of a rhizome and the leafy stems of *P. bulbosa* and an inflorescence of *P. minor*, a statement which is borne out by the description in Roemer & Schultes' 'Systema.' The specimens received from Australia and from Natal agree perfectly, with this exception : that the specimen received from Professor Ewart has an unusually long and rigid

cylindric spike (16 cm. long) with somewhat smaller and narrower spikelets (5–5·5 mm. long instead of 6 mm.), the narrowness being mainly due to the keels being less widely winged. It has, however, to be pointed out that the spikelets are young and had to all appearances at the time of gathering not yet attained to their full size. This specimen was named *P. bulbosa*, L., at Kew, whilst Professor Hackel was inclined to consider specimens from the same source as a new species, *P. stenoptera*, so called on account of the narrow wings. The samples communicated by Mr. Maiden and Mr. Medley Wood are fully developed and certainly confirm the determination of the grass as *P. bulbosa*. They differ from the typical Mediterranean plant known under that name in nothing but the stouter stems and altogether more luxuriant growth and the obscure but still noticeable swelling of the basal internodes, a character to which the grass owes its name. The plant is, however, able to adapt itself to a great variety of external conditions, and the development of the vegetative parts vary accordingly. Fairly luxuriant specimens with slightly swollen basal internodes are extant in the Kew collections from Algeria, representing a strain such as might have given rise to the luxuriant Toowoomba race. It is stated by Dr. Ewart (*Journ. Dept. Agric. Victoria*, vol. vi., 1908, p. 739), that the Australian "P. commutata" differs from *P. bulbosa* and also from *P. arundinacea* in the absence of the three sterile glumes. If this were so, we should have to accept Hackel's view and treat the grass as a distinct species. The condition and number of the "sterile glumes" in the Toowoomba grass is, however, exactly the same as in *P. bulbosa*. The spikelet of *Phalaris bulbosa* is made up of five glumes. The two lowermost (glumes I and II) are by far the largest and act as an involucre. The two next following (glumes III and IV) are very much reduced ; III is represented by a small cartilaginous scale with a tiny membranous appendage ; IV by a similar slightly larger scale with a linear-subulate appendage, which reaches up to $\frac{1}{3}$ or almost $\frac{2}{3}$ of the last glume (V) which is fertile. In Hackel's terminology we would therefore have to speak of four "sterile glumes." As to the spikelets of *P. arundinacea*, they have the same number of "sterile glumes," but glume III is less reduced and very similar to glume IV, both being almost half as long as glume V. Under the circumstances there is no occasion for the assumption of a hybrid origin for the Toowoomba grass or for treating it as a new species. It appears to be simply a very robust race of the Mediterranean *P. bulbosa*, L. Whether it actually sprang up from seed introduced into the Toowoomba gardens from America will probably remain uncertain if we consider that 20 years elapsed between the receipt of a parcel of grass seeds from New York and the discovery of the grass on a rubbish heap, and that there is apparently no direct evidence of a connection between these two facts. Moreover there is nothing in the publications of the Agricultural Department of the State of New York to show that the grass was in cultivation or under trial in New York about the year 1884. Nor does it seem to have been grown anywhere else so far. On the other hand, its natural distribution from Portugal and Morocco to Mesopotamia, and the fact that it often occurs on cultivated ground, and particularly on

the borders of cornfields, suggest its accidental introduction with seeds from the Mediterranean region. Some authors prefer the name *P. nodosa*, L., to *P. bulbosa*, L., but Hackel explained in 1880 (*Cat. rais. Gram. Portug.* p. 2) why *P. bulbosa* has to stand, and it is hardly necessary to repeat his arguments.

How far the claims of the grass as a first-class fodder grass are justified is still to be seen, but the reports from Australia as well as from Natal are undoubtedly promising.

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## XXXVIII.—CUCUMBER AND TOMATO CANKER.

(*Mycosphaerella citrullina*, Grossenb.)

(With Plate.)

G. Massee.

Dr. Grossenbacher has recently described a disease caused by *Mycosphaerella citrullina*, Grossenb., which proves very destructive to melons in the United States. The disease is first indicated by the wilting of the leaves, after which the entire plant collapses and dies. The nodes of the stem, especially those nearest the root, present a water-logged appearance, often accompanied by an exudation of gum. At a later stage the diseased patches change to an ashy-grey or whitish colour, and the epidermis becomes broken up and studded with numerous perithecia belonging to the conidial stage of the fungus. This is followed by the production of the ascigerous condition of the fungus when the host is dying or dead. Infection experiments proved that the spores of the fungus could infect uninjured melon plants, also other allied plants, although curiously the cucumber proved immune, and resisted all attempts at infection in the United States.

Quite recently specimens of diseased tomato plants were received at Kew, from Waltham Cross. In each case the base of the stem was considerably shrunken, and the cortex destroyed, and studded with numerous minute perithecia, which on examination proved to be identical with the conidial or *Ascochyta* stage of the American melon disease. In some specimens the nodes of the stem were also attacked. Plants attacked as above promptly succumbed; a grower's statement being that they fell over like nine-pins.

Almost simultaneously with the above, a diseased cucumber plant was received from Gloucestershire, which showed the whitish diseased nodal portions of the stem, characteristic of the American melon disease. Numerous minute perithecia, which proved on examination to be those of the *Ascochyta*, were present on the diseased patches.

Cucumber plants attacked by this disease are stated to be quickly killed outright. Experiments conducted at Kew showed that the spores from diseased cucumber plants would infect young tomato plants, and that spores from a tomato plant would infect vegetable marrow plants. In both instances the plants infected showed the conidial (Ascochyta) stage of the fungus within a fortnight, and in both instances the lesions formed were characteristic.

TOMATO CANKER.



[*To face page* 292.

Both in this country and in the United States the conidial form of fruit is responsible for the rapid extension of the disease.

The simultaneous occurrence of this well-known American disease at two widely separated localities in this country is difficult to explain, as living melon plants are not imported, and the fungus does not attack the fruit.

Conidial form. Pycnidia depressed-globose, wall thin, parenchymatous, pale brown, mouth minute, distinct, 90–160 $\mu$ diam., produced under the epidermis, then bursting through ; conidia hyaline, cylindrical, becoming 1-septate and slightly constricted at the centre, 9–16 × 4–6 $\mu$.

Ascigerous form. Perithecia depressed-globose, rough, dark coloured, mouth papillate, becoming almost superficial, 100–165 $\mu$ diam. ; asci cylindric-clavate, 8-spored ; spores hyaline, oblong-fusoid, 1-septate, distal cell often largest, usually more or less constricted at the centre.

The result of preventive experiments conducted in this country are not yet recorded. According to Grossenbacher spore inoculations conducted in the field were almost complete failures, and it is considered that the very moist, warm environment of the greenhouse is essential for the infection and development of the fungus. Further experiments showed that the spores of the fungus are not killed by exposing infected soil to weathering conditions of winter, nor by fumigation with hydrocyanic gas. It seems that an epidemic may be prevented by spraying thoroughly with Bordeaux mixture before the disease appears, and repeating at intervals, to keep the plants covered with the solution.

J. G. Grossenbacher ; N.Y. Agric. Expt. Sta., Technical Bull. No. 9 (1909).

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## XXXIX.—LIGNUM NEPHRITICUM.

(*Eysenhardtia amorphoides*, H.B.K.)

Otto Stapf.

Early in the present year an inquiry was addressed to the Director of the Royal Botanic Gardens, Kew, concerning the origin of Lignum nephriticum, a wood which formerly, but mainly during the seventeenth century, attracted a good deal of attention on account of its medical as well as physical properties, but subsequently was completely lost sight of. It had been referred by authors to various species ; but it was quite clear that so far as the pharmacological literature was concerned, nothing definite was known as to its origin. The most remarkable character of the wood, and the one on which all the earlier writers insisted, was that a watery infusion of the wood assumed after a certain time a blue colour. In the Kew Museum the only sample professing to represent the product was a specimen which had been obtained from Messrs. Menier & Cie., Paris, as Bois néphrétique, in 1851. It was not named botanically, but had the appearance of a sapotaceous wood, and did not give the characteristic reaction with water. Linnaeus referred Lignum nephriticum to

the Horse-radish tree (*Moringa pterygosperma*). Although it was *a priori* very improbable that this identification could be correct, this wood too was tried, but with the same negative result. Similarly the wood of *Pithecolobium Unguis-cati*, which had also been credited with yielding Lignum nephriticum, was found to give no results. Hernandez, indeed, gave a description of the Lignum nephriticum plant, but it was too vague to serve as a guide. But he quoted two old Mexican vernacular names for it, Coatli and Tlapalazpatli. On looking through the Mexican literature on plant names I found in Ramirez and Alcocer's "Synonimia de las Plantas Mexicanas" two similar terms, viz., 'Coate or Coatl' and 'Tlapahoaxpatli' referred to *Eysenhardtia amorphoides*, and under *Eysenhardtia amorphoides* also the designation 'Leño nefritico,' but the authors gave no information beyond the bare names. There were, however, two timber specimens of *Eysenhardtia* in the Kew museum, and one of them, obtained from the Paris International Exhibition of 1900 was marked 'Cuatl.' This, when infused with water, gave the peculiar reaction of Lignum nephriticum in an unmistakable way. A comparison of Hernandez' description with herbarium specimens, and with technical descriptions of *Eysenhardtia amorphoides*, made it clear that this was actually the source of the old Lignum nephriticum. There might have been some doubt in so far as Hernandez described the flowers of his 'Coatli' as yellow whereas those of *Eysenhardtia amorphoides* are generally stated to be white; but a variety with yellow flowers has actually been recorded. Moreover one of the localities mentioned by Ximenes in his 'Quatro libros de la Naturaleza'—a work that, as will be shown, is based on a condensed version of Hernandez' manuscript—is practically one of the two places where Humboldt collected the specimens used in preparing the description of *Eysenhardtia*.

In the course of the present search for the lost wood so much information concerning the history of the wood and its medicinal use and peculiar physical properties has come to light that it seems worth while to give a connected account of the article, omitting any reference to the chemical nature of its active principle—an aspect of the enquiry which must be left over until an adequate quantity of material comes to hand to admit of research in that direction.

1. **The early history of the wood and its medicinal application.**—Among the many new and curious articles with which, after the discovery of America the Materia Medica of Europe was enriched there was a peculiar wood which had the reputation of being a certain remedy in disorders of the kidneys and the bladder. Nicolas Monardes, a learned doctor of Sevilla, writing in 1569* records that, 25 years before he had seen a pilot who was suffering from some trouble of the bladder, use a certain wood whereupon he recovered and enjoyed good health. Subsequently, he continues, this wood was frequently imported from Nueva España (Mexico) into Spain, and it was sold with such good profit that simultaneously a substitute appeared in the market. The genuine article, however,

* Monardes, Nic., Historia medicinal de las cosas que se traen de nuestras Indias occidentales, 1569; ed. ii., 1574, pp. 24, 58.

was easily recognised, as it alone possessed the remarkable property of causing clear water when soaked in it to assume an azure blue colour which gradually deepened, and this, as Monardes points out, in spite of the fact that the wood itself was whitish. Monardes knew of no name for the wood or for the tree, and simply classed it as 'palo para los malos de los riñones y de urina' or 'palo de la urina.' Nor had he anything to add as to the nature of the tree; but he described the wood as it was then imported as resembling that of the pear tree, and destitute of knots. Although a keen collector of American products, Monardes himself was never in America, which no doubt accounts for the scantiness of his information. To learn more about the wood we have to turn to his great contemporary, Francisco Hernandez, the Mexican explorer, who spent seven years in Nueva España. Unfortunately the records of Hernandez' work were almost completely destroyed in the fire of the Escorial in 1671, and only fragments and abstracts, made from them before the conflagration, have reached us; but even these fragments contain valuable information about the wonderful wood. The history, however, of the publications attributed to Hernandez, or connected with his name, is somewhat involved and requires explanation. Francisco Hernandez, physician at the Escorial and the court of Philipp II. of Spain, was, in 1570, commissioned by his king to explore Nueva España and report on its natural resources. He left the same year for the New World, with the title of Protomedico de las Indias, and stayed there until 1577, amassing an enormous amount of notes and illustrations which filled 24 or, according to some authors, 27 large volumes. They were, after his return, placed in the library of the Escorial, gorgeously bound up in leather, gold and silver,* but there seems to have been no money forthcoming for printing. Nine years later, in January 1587, Hernandez died, brokenhearted and worn out by intrigues, and the after effects of his strenuous labours. Not a line of his report had, up till then, been published. Subsequently King Philipp II. charged his physician, Nardo Antonio Recchi, of Monte Corvino in Italy, with the preparation of an abstract from Hernandez' voluminous manuscript, which was to contain all the information useful for the art of healing. This Recchi did, but he in turn did not live to see his epitome published. A copy of his compendium, however, revised by Francisco Valles, a Spanish physician of great reputation, somehow found its way to Mexico, where it was translated from the original Latin into Spanish, and, with numerous additions, was published by the Dominican Francisco Ximenes in 1615 under the title 'Quarto libros de la naturaleza y virtudas de las plantas y animales que estan recevides en el uso de Medicina en la Nueva España.' Meanwhile Recchi's manuscript had, after his death, passed into the hands of his nephew Antonio Petilio, in Monte Corvo, where, in the early years of the 17th century it was discovered by members of the Accademia dei Lincei, of Rome, which had then just been founded. One of the Lincei, Johannes Schreck, of Constanz, better known as Joannes Terrentius, was entrusted with the task of editing and annotating the chapters on plants,

* León, Bibl. Bot. Mexicana, Suppl., p. 307.

which he is stated to have done in the short period of one year, and presumably before 1611. In any case, by 1626 the preparation for the issue of the whole of Recchi's manuscript compendium was completed. The publication, however, did not take place until 1651, the title of the work being 'Rerum Medicarum Novae Hispaniae Thesaurus seu Plantarum Animalium Mineralium Mexicanorum Historia ex Francisci Hernandez Novi Orbis Medici Primarii relationibus in ipsa Mexicana urbe conscriptis . . . . .' No attempt was made, either in connection with this publication or otherwise, to draw upon the original manuscript in the Escorial, and when this place was destroyed by the great fire of 1671, the invaluable manuscript with its costly illustrations, together with countless other treasures, almost completely perished. Towards the end of the 18th century, however, a manuscript codex of five volumes, representing another epitomised version of Hernandez' reports, annotated and amended by himself, was found in the library of the Convent of San Isidro, in Madrid. Three of the volumes contained botanical matter; these were published as they stood in 1790 by Professor Gomez Ortega, under the title 'Historia Plantarum Novae Hispaniae.' Each of the three editions of Hernandez' work contains a chapter on 'Coatl,' that is, the tree yielding the wood which is the subject of this article; but although not exactly contradictory, the accounts vary considerably in extent and treatment, the fullest being that in Ximenes' 'Quatro Libros.' This work is extremely rare, and it seems therefore worth while to translate and reproduce the whole chapter *in extenso*, the more so as Ximenes had the advantage of being on the spot, and therefore able to add, as he almost certainly did, from his own experience. This is then the translation of Chapter xxv. of his 'Quatro libros':—

"Chapt. xxv. of that which is called Coatl.* The said Coatl is a *so-called* shrub, *although I have seen it taller than many a tall tree;* some also call it tlapal ezpàtli, or red blood medicine. It is a tall shrub with a stout stem, which is destitute of knots, after the manner† of a pear tree. The leaves are like those of the chick-pea, but smaller, or almost like those of the rue, but somewhat larger, *about half way between these two extremes*; the flowers are yellow, delicate (lazia), small and arranged in long spikes. It is cold and humid, though not far from temperate. It grows in moderately warm districts as that of Mexico, and in many warmer parts as in Guachinango,‡ *Chimalhuacan, Chalcoy, Tepuztla, and in almost the whole of the unhealthy country of Coyohuaca, and in many other parts.* The water with which chips of the trunk of the plant have been infused, assumes an azure blue colour, and if drunk,

* From internal evidence it is practically certain that the latter part of this account from "A Biscayan merchant . . ." onwards is an addition by Fr. Valles. It is absent in the edition of the Accademia dei Lincei of 1651, as are also the passages printed here in italics. Whether they are additions by Ximenes, or were taken over from Hernandez by Recchi in his condensed version, but struck out by Terrentius, is impossible to say, although the former is more probable.

† "manera de peral"; Monardes in speaking of the wood says, "Madera de peral." The Recchi edition of Hernandez has "materiae pyri,' and Ortega's no allusion at all to Pyrus.

‡ Guauhchinacensis" in Recchi's and Ortega's editions.

it refreshes and relieves the kidneys and the bladder, alleviates the acidity of the urine, extinguishes fever, heals colic pains, and it does all this with much greater force and efficiency if the root of the Maguey * is added, although it loosens the bowels. I have experienced this myself many times, and the same has been stated by others. It is said that its gum cures inflammation of the eyes and removes fleshy growths from them. It was first brought to Spain many years ago, and they call it there 'palo de los riñones' (kidney wood), and prepare the water in this way :—They make an infusion of the wood cut up into small chips and *of a moderate quantity of* clear water, *such as they drink ordinarily*, and let it stand until the water is taken and finished, when they make another infusion of the same chips, and that being used up, another, and repeat that as long as the water turns blue. *Those who change the chips every day are therefore much mistaken, and still more those who make drinking vessels out of the thick stem to drink from as the wood totally loses its efficacy within a fortnight if continually infused, and afterwards does not colour the water any longer.* As a rule the water turns a clear azure blue within half-an-hour, and the colour deepens as time goes on, so that it appears quite a miracle to those who look on. There is also another kind of this plant which possesses the same properties, but does not colour the water. A Biscayan merchant took more than fifty thick logs of that wood to Spain, and he told me that it served for many other ailments, and although we have not had so far any experience, we will on the authority of Monardes, the Sevilla physician, repeat what he says in his book in these words :—'They also bring from Nueva España a wood which resembles pear-tree wood, and is bulky and without knots, and they have used it for many years for diseases of the kidneys, the liver and urinary ailments. I saw it for the first time—about 25 years ago—when a pilot who was suffering from a weakness of the bladder and the kidneys used it and got well and hale. Since then I have noticed that much of it was brought from Nueva España, and that it was used for those ailments by those as well who discharged the urine with difficulty as by those who did it insufficiently, it thus being a remedy for obstructions, for which reason it also cures and heals the milt and the liver as has been found out a few years ago, and they find it very profitable. The water is prepared in this way. They take the wood, and cut it up into many fine chips, as many as possible and not very large, put them into clear fountain water, which has to be very good and pure, and keep them thus as long as they take the water. After half an hour a very light azure blue colour begins to show, and it becomes more and more blue, although the wood is white. They go on drinking the water, and with the water their wine and it has a very wonderful and obvious effect, without any inconvenience, and there is not more required than order and regularity ; nor does the water possess more flavour than if nothing had been put into it, for the wood does not affect it. Its complexion is warm and dry in the first degree.' So much according to Monardes ; on my own authority, I cannot say anything ; but I will say of that wood that in Sevilla

* "Metl," in Recchi's edition.

† "Lignum nefriticum" (Recchi's ed.).

I saw a certain person use it who had a piece, well—a span long. He divided it into two pieces and put them into a jar of water and left it there for six or eight days, and I saw him with my own eyes fill a chamber-pot to more than one-half every day, and at the end of 15 days, I saw him quite well, and yet before he had suffered much from retention of urine."

Hernandez' account of the Coatli and its peculiar reaction on water and medicinal use is supported by contemporaneous and quite independent witnesses, the monks Bernardino de Sahagun and Alonso de Molina. Bernardino de Sahagun went out to Mexico in 1529 and died there, probably towards the end of the century, at the age of 90. He left a manuscript of a 'Historia General de las Cosas de Nueva España,' which in 1829–30 was published in a Spanish, and in 1880 in a French, version (by D. Jourdanet and R. Simeon). To quote from the latter, he refers to 'Coatli' in these terms (p. 731): "There is a wild tree, know as Coatli, of which they cut rods for making baskets called 'uacales.' It is a supple wood, and if it is put in water, this turns blue. It is used medicinally for the urinary tracts." Alonso de Molina, who in 1571 published in Mexico a vocabulary of the language of the conquered Aztecs, also has the word 'Coatli,' and explains it thus: "Certain rods which are soaked and the water drunk thereof."

Although Hernandez' work remained unknown, outside a very limited circle, until 1651—for Ximenes' book is nowhere referred to in the medical or botanical literature of the time—the knowledge and the use of the wood for medicinal purposes spread early to Italy and other parts of Europe, no doubt chiefly owing to the unparalleled success of Monardes' book, which disclosed a new world of medicinal treasures to his contemporaries, and within a short time was translated into Latin (in five editions), English, Italian, and French. The complete absence, however, of information in Monardes regarding the nature of the tree from which the wood came rendered any attempt at botanical classification *a priori* illusory. Only Cesalpini,* with his usual ingenuity, hazarded a guess. Relying on the remarkable property of the Mexican wood of making water appear blue, and knowing that a similar effect was produced by soaking the inner bark of the ash in water, he suggested that the Mexican wood might also be referable to the genus *Fraxinus*. Caspar Bauhin accordingly placed this 'Lignum peregrinum aquam caeruleam reddens" in his Πιναξ (1623), p. 416, under *Fraxinus*, but otherwise nothing more was heard for a considerable time as to its origin. It was only through the publication of Recchi's condensed edition of Hernandez in 1651 that another interpretation of the wood, by that time generally designated 'Lignum nephriticum,'† became known. Terrentius, the annotator of Hernandez, concluded—as we shall see quite correctly—that the wood must be that of a Leguminosa. This he says (p. 119) is evident, not only from the leaves resembling those of the chick-pea and the yellow flowers, but also from its property of removing gravel, a property which is also found in *Genista* and almost all the

* Caesalpinus, De Plantis Libri xvi., p. 44.

† Parkinson, Theatr. Bot. (1640), p. 1664, is usually quoted as the author of this term.

'Leguminum genera.' Tournefort* also made an attempt to ascertain the origin of the remarkable wood when, during the eighties of the seventeenth century at Cadiz, he inquired for it and was given a dried branch of a plant which he described but could not classify. The description, however, shows clearly that he was misled, and it was so much at variance with Hernandez' account that no further notice was taken of it. More serious, however, was a mistaken suggestion made by Plukenet in his Almagesta,† as it was the origin of an erroneous identification which found its way into many books, even of our own day. Speaking of *Moringa Lentisci folio* (that is our *Moringa pterygosperma*, the Horse-radish tree of India) he adds: "Coatlis (quam alii Tlapolezpatlin, s. Medicinam sanguinis coccineam vocant) foliis Ciceris, vel Rutaceis; cujus lignum est Lignum Nephriticum Hernandez, apud. Recc. lib. 4. c. 25. de Laet.‡ Ind. Occid. lib. 5. carp. 3. Kircher. in Arte magn. lucis et umbrae. *Huic propius accedere videtur.*" Why Plukenet should have suggested an affinity—his statement does not amount to more—of the Mexican Lignum nephriticum tree and the *Moringa*, which he well knew came from Ceylon, is difficult to understand. However that may be, his suggestion of affinity was turned into a statement of actual identity in the third edition of Dale's 'Pharmacologia' (1737), p. 336, and it was equally apodictically repeated by Linnaeus in his 'Flora Zeylanica' (1747), p. 67, and 'Materia Medica' (1749), p. 69. It was thus duly hall-marked and widely accepted, although Murray§ pointed out in 1776 that Linnaeus' identification must be wrong. By this time the wood had ceased to be used and disappeared from the market, and probably very few of the writers of this and the following period saw it. In Pomet's 'History of Druggs' (1712), p. 62, it is still called a 'sovereign remedy' in stone and gravel, and Geoffroy, Tournefort's successor in the College Royal at Paris, also praises it as a very good aperient and diuretic and one of the best antinephritics known in 'Physick,' but 10 years later we learn from Joseph Miller's Botanicum officinale, p. 267, that it was only rarely used, and Linnaeus (l.c.) in 1749 declares it as 'exoletum.' Still, it must have been obtainable even then, for in the same year a dissertation by Beer Wolff‖ (praeside Joh. Fried. Cartheuser) was published which, among other things, had Lignum nephriticum for its subject. The writer used, no doubt, the genuine article, and classes it in the "aperitivis, laxantibus, strictis dictis et specificis lithontripticis." He tried to isolate the active principles which he recognised in a resinous and a gummose substance, but chiefly in the latter. This was the first and the last attempt in this direction, at least so far as Europe is concerned.

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* Tournefort, Materia Medica, Ed. angl. (1708), p. 119.

† Plukenet, Almag. Bot., p. 253.

‡ This quotation is quite out of place. De Laet, in his Beschrijvinghe on West Indien, lib. v. cap. 3 (p. 173), speaks of a Copal called Quahuitl, and a Cuitlacopalli. Copalquahuitl is the Nauatl word for *Schinus molle*, and Cuitlacopalli, if not the same, stands for some other resin, as the whole chapter deals with scented resins and gums.

§ Murray, Appar. Medic. vol. ii., p. 522.

‖ Cartheuser, Joh. Friedr.—Praes. Diss. de Ligno nephritico, Colubrino et Semine Santonico. Resp. Tal. Beer Wolff, Francf. Viadr. pp. 4, 5.

Whether the wood fell into disuse because the medical practitioners did not find it so efficient as it was said to be, or because it could not compete with new and better drugs, or finally because it was not any longer possible to obtain the genuine article at a reasonable price, is uncertain. We have seen that a spurious article was in the field from the very first introduction of the wood into Europe, and as others followed, these substitutes may have helped to drive it out of the market. What the early substitutes were we do not know. Pomet,* who died in 1699, mentions a "red ebony or Pomegranate" from the (West) Indies and Brasil as one of the spurious Nephritic woods, and Cartheuser does the same. In the beginning of the last century *Pithecolobium Unguis-cati* became known as 'Nephritic tree,' and its wood was supposed to be the Lignum nephriticum of Hernandez. In this case, however, the application of the term 'nephritic' rested on the superstition of a pious Spanish bishop,† according to whom the kidney shape of the seeds of this plant indicated that it was to be used in diseases of the kidney. Even the "white poppy substance" about the seeds had its significance, standing for the fat of the kidney. Another substitute of more recent times was *Erithalis odorifera*,‡ a West Indian Rubiaceous tree, much valued for its hard, scented wood. In this case the confusion and the consequent application of the name Lignum nephriticum may have been due to the fact that the resin of this tree was recommended in cases of stranguria.§ In any case, so far as European literature is concerned, all knowledge of the Lignum nephriticum of Hernandez was by that time lost, and apart from Guibourt,‖ who describes the wood from undoubtedly genuine samples which he examined, it is not even mentioned in the principal compendia of Materia Medica of the last century, such as Kosteletzky, Nees, Geiger, Pereira, Flückiger, &c.

2. **Lignum nephriticum of recent Mexican literature.**—In the introduction to this article reference was made to Ramirez and Alcocer's list of Mexican vernacular plant names as the work containing the correct identification of Lignum nephriticum, although without any attempt in the way of explanation. The authors refer in their 'Sinonimia vulgar y scientifica de las Plantas Mexicanas' to publications by Villada (1883), Barcena (1891), and Urbina (1897), but as they are unknown to me they have been passed over; besides, from their titles they seem to be little more than catalogues. There may also be further contributions in modern Mexican literature, throwing light on the question; but if so, they have not been noticed in European journals and works on Materia Medica, and they are in any case inaccessible. There is, however, a paper by Dr. Fernando Altamirano which deserves being mentioned as it actually contains the solution of the problem of the origin of Lignum nephriticum, although involved in a very curious muddle. In an article on the medicinal *Leguminosae* of Mexico in volume iv. of 'La Naturaleza' (1878), pp. 97–99, he enumerates two plants under

* Pomet, Hist. Druggs, p. 62.
† Lunan, J., Hort. Jamaica, vol. ii., p. 2.
‡ Rosenthal, Syn. Plant. diaphor. p. 332.
§ Descourtilz, Fl. Pitt. Antill. vol. iv. (1827), p. 43.
‖ Guibourt, Hist. Nat. Drog. Simpl. vol. iii., p. 327.

the name of Coatli; one, 'Coatli (Serpienti de agua),' he identifies with "*Viborquia polistachia*, Ortega" (*Viborgia polystachya*), the other "Coatli, 2°" with *Eisenhardtia amorphoydes*, H. B. (*Eysenhardtia amorphoides*). The former he takes to be the Coatli or Tlapalezpatli described by Hernandez; the latter the second species mentioned, but not further described by him; but curiously enough, he says, Guibourt and others were mistaken in identifying the Coatli with the "Madera nefritica" (Lignum nephriticum), which is the wood of Taray or *Guilandina Moringa*, that is our *Moringa pterygosperma*. He evidently did not know the history of Lignum nephriticum, and relied blindly on the authority of Herrera, whom he quotes, and who in turn merely followed Linnaeus. He was also unaware that the names which he used in distinguishing his two kinds of Coatli are absolute synonyms. Altamirano further says the confusion of the Coatli and the *Moringa* was brought about by the fact that the latter is used in Mexico to this day for the same complaints for which the Aztecs used the former; we have, however, seen how the confusion actually did arise. Moreover, 'Taray' is given by Ramirez and Alcocer as a name used in several places for *Eysenhardtia amorphoides*, whilst *Moringa* does not occur at all in their list. According to Altamirano the Coatli is at present used only on farms to prevent sickness among fowls. For that purpose they make troughs of the wood and fill them with water for the birds to drink from, and the water is always blue; or if they use troughs of other material, they at least put a piece of Coatli wood into the water. But he thinks that the plant has been much underrated by modern pharmacologists and chemists. He also quotes Mar. Bárcena as having produced from it a yellow-brown substance with great staining power. As to the two Coatli, Altamirano calls the first "Palo dulce amarillo" and the other "Palo dulce blanco." "Palo dulce" is the common Spanish term for *Eysenhardtia*, and it would be interesting to know whether the adjectives 'amarillo' and 'blanco' refer to the colour of the flowers, corresponding to the yellow and the white variety, or to the darker heart wood and the whitish sapwood.

**3. The fluorescence of Lignum nephriticum infusions.**—We have seen that the earliest writers on Lignum nephriticum mentioned the peculiar property it possesses of rendering water blue when an infusion is made, and they insisted upon this as a specific criterion. This property surprised them the more as the wood itself was "white," which in this case probably only means 'of the colour of ordinary wood,' and not indicating the presence of any specific colouring matter that might yield a blue solution. Moreover, it seems to point to their having seen only pieces of sapwood, as the heart wood is of a dark brown or reddish-brown colour. It is curious that they did not mention that the blue colour of the infusion appeared only under certain conditions of illumination, a circumstance which must have added much to the miraculous character of the phenomenon. The first to give a fuller description of the changes of colour observable in an infusion of Lignum nephriticum was Johannes Bauhin.* Probably towards the end of

* Bauhin, Joann., Hist. Plant. vol. i., p. 492.

the sixteenth or it may have been in the first years of the following century he received from his learned colleague, Dr. Schopff, physician to the Duke [Friederich I.] of Württemberg, and by the order of the Duke, a cup made of 'Palum Indianum,' almost a span in diameter and of unusual beauty, and with it chips of the same wood of a reddish colour and without any definite taste. Of this he says in his 'Historia Plantarum,' under Lignum nephriticum : "The chips soaked in water coloured it in a short time wonderfully blue and yellow ; in obverse (reflected) light it exhibited in a beautiful way the changing colours of opal, so that it varied like that gem from brilliant orange, yellow and red to glowing purple and sea-green." Thirty or forty years later, a similar cup reached the German Jesuit and polyhistor Athanasius Kircher who then lived at Rome. It came to him from the Mexican procurator of his order, and so excited his wonder that after having experimented with it he presented it to the Emperor. He gave a full account of his experiments in his Ars Magna Lucis et Umbrae, which appeared at Rome in 1646. As this book is somewhat rare, and at the same time often quoted, a translation of the chapter is given here, omitting those parts which are more or less quotations from Recchi's manuscript which may have been accessible to him or from Ximenes' 'Quatro libros.' The chapter (p. 77) is headed "Experimentum de ligno quodam admirabili aquam in omne genus colorum tingente," and runs thus :—

"In this place we think we ought not to pass over a certain kind of white Mexican wood, called Coatl and Tlapazatli by the natives, for, although it has so far been found to colour water only blue, we have by continued experimenting ascertained that it may give the water any kind of colour which justly appears paradoxical . . . The wood of this tree is made into goblets, and it renders water poured into them intensely blue, of the colour of the flower of 'Buglossa' (*Anchusa*), and the longer the water stands in them, the deeper the colour. If then the water is poured into a glass globe and exposed to the light, no trace of the blue light will be left, and it will appear just like pure clear fountain water. If you move this phial towards a more shaded place, the whole liquid will assume a most delightful green colour, and if towards a still more shaded place, it will turn more or less red, and so change its colour in a wonderful way according to the nature of its surroundings. In the dark, however, or in an opaque vessel it will regain its blue colour. I was the first, I believe, to have observed this chamaeleon wonder in a cup which I received as a gift from the Mexican procurator of our Society, and I presented it afterwards to his Majesty the Emperor as something exotic and only known to few. At first I failed to understand the cause of the curious phenomenon which I examined as I saw that the colour could neither be classed as an apparent nor as a true, or material colour—not the former because it is a true and real colour in so far as it results from the nature of the wood and not from the various modifications of the light as is the rule with apparent colours ; and yet it cannot be considered as a real colour in so far as no colour is observable when the infusion is held up to the light, and the latter presents itself in different colours only if held against different objects ; but by

various experiments I found the cause out in the end and I shall disclose it further on . . . ." This, however, he never did. Not many years afterwards Robert Boyle, the celebrated English physicist took up the study of the optical properties of Lignum nephriticum infusions, and he published the results of his researches in his " Experiments and considerations touching Coulours " (1664), p. 203 et ss., devoting a whole chapter (Experiment X) to this subject. Whilst referring for details to his book, I may in this place point out, that Boyle here gave for the first time a precise and scientific description of the phenomenon, now known as fluorescence and so exquisitely presented by the infusion of this rare wood. He pointed out that the " tincture afforded by the wood must proceed from subtiler parts of it drawn forth by the water " and also showed that the colour effects disappeared on the addition of small quantities of acids, but reappeared on neutralisation with alkalis. How greatly he, and with him others, was impressed by the strange phenomenon, may be seen from the following quotation :—" These and other Phoenomena, which I have observ'd in this delightful Experiment, divers of my friends have look'd upon not without some wonder, and I remember an excellent Oculist finding by accident in a friends Chamber a fine Vial full of this Liquor, which I had given that friend, and having never heard anything of the Experiment, nor having any Body near him that could tell him what this strange Liquor might be, was a great while apprehensive, as he presently after told me, that some strange new distemper was invading his Eyes. And I confess that the unusualness of the Phenomena made me very solicitous to find out the cause of this Experiment, and though I am far from pretending to have found it, yet my enquiries have, I suppose, enabled me to give such hints, as may lead your greater sagacity to the discovery of the cause of this wonder." For that, however, the times were not ripe, and it was long before a satisfactory explanation of the phenomenon was given, not deduced, it is true from the Lignum nephriticum infusion—for this wood was by that time completely lost—but holding good for it. Boyle, in the course of his researches, became acquainted with Kircher's account, and was inclined to criticise it, but on the whole it is fairly correct as far as it goes. To judge from his description of the wood as white, he probably worked with sap-wood or young wood, and his infusions were accordingly light coloured, or they were greatly diluted, notwithstanding which they might in very strong light still have shown distinct blue fluorescence, and as to the variety of colours, Boyle himself came very near it when using a round phial. With a fairly strong infusion in a glass globe, and sunlight falling in through several windows in front, and with a dark background, all the beautiful colour effects described by Bauhin and Kircher may be obtained. In 1689 and 1690 Rud. Jac. Camerarius, who then occupied the chair of physics in the University of Tübingen, was engaged in similar researches, and published a " Schematismi Colorum infuso ligno nephritico propriorum," followed by a " Continuatio Tentaminum circa lignum nephriticum," but I have seen neither. Newton* also experimented

*Opticks, ed. iv., p. 166.

with the wood and attempted an explanation of the phenomenon; but by this time the wood must have been already very rare, and after him no physicist seems to have had a chance of working with it.

The writer's own experiments in this direction were mainly intended to make sure that the wood under examination was actually the Lignum nephriticum of the 16th, 17th and 18th centuries, and especially that of Bauhin, Kircher and Boyle, and they consisted, therefore, chiefly in the repetition of their experiments. And in so far they were perfectly satisfactory and conclusive. It is now to be hoped that sufficient material will soon be at hand to admit of the identification of the glucoside, or whatever the substance may be, to which the fluorescence is due. It may, in conclusion, be added that a decoction of leaves and fragments of young branchlets showed no trace of fluorescence, and that the outer sapwood seems to be poor in the fluorescent substance, whilst the best results are obtained with the inner layer of the sapwood and the outer heartwood zone.

4. **The mother-plant of Lignum nephriticum.**—*Eysenhardtia amorphoides* was discovered by Humboldt, near San Augustin de las Cuevas, to the south of the city of Mexico, also near Guanajuato, at an altitude of 2200–2400 m. San Augustin de las Cuevas is a village, a few kilometres to the south of Coyohuaca (or Coyohuacan), the place to which Ximenes refers in the passage "and in almost the whole of the unhealthy country of Coyohuaca." Of the other localities mentioned by Ximenes, Chimalhuacan is the name of a village and a hill southeast of the lake of Tezcuco, about 10 kilometres E.S.E. of the city of Mexico, Chalco, a town on the east shore of the lake of the same name, about 16 kilometres S.E. of Mexico, whilst Tepuztla is evidently identical with Tepozotlan, 16 kilometres to the north of the city. Guachinago, the only locality mentioned in the two other editions of Hernandez, is Guachinango or Huauchinango in the State of Puebla, and on the eastern edge of the Central Mexican plateau. All these localities are within the area of *Eysenhardtia amorphoides* as we know it at present. In the neighbourhood of Mexico and the adjacent states, *Eysenhardtia amorphoides* is fairly uniform, and forms a tree, or shrub with small, rather hairy leaflets, 3–7 (rarely 10) mm. long. This is the form described and figured by Humboldt, Bonpland and Kunth,* and also the same on which Ortega † based his *Viborquia polystachya*. Farther north, however, it is replaced by a form with larger, less hairy and more coriaceous leaflets, 10–17 mm. long. This ranges as far as Sonora in the north, and the Rio Grande to the north-east. There seems to be no difference except that in the leaves, and the two forms may best be treated at present as geographical varieties. As A. Gray ‡ described the latter of the two as var. *orthocarpa* of *E. amorphoides*, this name may be retained for it, although the name is misleading in so far as the original *E. amorphoides* is just as much "orthocarpa." The name was, in fact, chosen to distinguish this North Mexican plant from the

* Nova Genera et Species Plantarum, vol. vi., p. 491, tab. 592.
† Ortega, C. J., Nov. Rar. Plant. Dec. p. 66, tab. 9.
‡ Gray, A., in Smithson. Contrib., vol. v. (1853), p. 37.

*Eysenhardtia* of Texas, which has somewhat curved fruits, and was assumed to be the typical *Eysenhardtia amorphoides*. This was wrong, the Texas plant being a distinct species, described by Scheele * as *E. texana* as long ago as 1848, and confined to Texas and the north-eastern States of Mexico. Another species, *E. spinosa*, Engelm.,† is found in Chihuahua, and still another, *E. adenostylis* Baill.,‡ is recorded from Guatemala ; but whilst the former is well marked, the latter approaches very closely to *E. amorphoides*, and was, indeed, issued as such (Plant. Guat. Donnell Smith, 3746) on the authority of Micheli. None of these species have been examined for their wood, and there is no record of their being used or possessing properties similar to those of the Coatli, excepting a note by Dr. Palmer,§ according to which "the wood (of *E. amorphoides* var. *orthocarpa*) steeped in water makes a sweet refreshing drink, much relished by fever patients." The genus *Eysenhardtia* comprises thus three well distinguishable species which may be characterised as follows :—

Leaflets in 10 to over 20 pairs :

Fruits pendulous, lanceolate, straight, or almost so—
*E. amorphoides.*

Fruits erect, cultriform and often more or less curved—
*E. texana.*

Leaflets in 4–6 pairs ; fruits very short, obliquely ovate—
*E. spinosa.*

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## XL.—DIAGNOSES AFRICANAE : XXX.

1031. **Monotes glaber**, *Sprague* [Dipterocarpaceae] ; affinis *M. africano*, A. DC., a quo differt foliis utrinque glabris supra nervis lateralibus non impressis subtus rete venularum inconspicuo.

*Arbor* 12–18 m. alta, ligno duro. *Ramuli* lenticellosi, longitudinaliter rugulosi, glabri. *Folia* oblonga, elliptica vel obovato-oblonga, basi rotundata vel subcordata, apice rotundata vel leviter retusa, 4–7·5 cm. longa, 1·5–3·5 cm. lata, tenuiter coriacea, glabra, supra vix nitidula, nervis lateralibus inconspicuis, venulis crebre conspicue reticulata, subtus opaca, nervis lateralibus elevatis venulis inconspicuis ; nervi laterales utrinque 6–8 ; petioli 4–10 mm. longi, supra pilosuli. *Inflorescentia* ut videtur brevis, pauciflora ; rhachis et pedicelli pilosi. *Fructus* subglobosi, circiter 1 cm. diametro, tomentelli, umbone terminali 1–1·5 mm. longo, calycis aucti segmentis anguste obovatis 2·5–2·7 cm. longis 1–1·3 cm. latis supra minute stellato-pubescentibus subtus puberulis.

Rhodesia. Valley of the Hanyani River, *Allen*, 734 ; "South African Gold-fields," *Baines*.

According to Allen, *M. glaber* is a tree, 40–60 ft. high, with hard, durable wood. The native name is "M'waru."

Specimens of a shrub, 4 ft. high, collected by Kirk on the western slope of the Batoka Hills may possibly belong to *M. glaber*,

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* Scheele, in Flora, vol. xxi (1848), p. 462.
† ex Gray in Bost. Journ. Nat. His., vol. vi. (1850), p. 174.
‡ Baillon in Adans. vol. ix. (1870), p. 239.
§ ex J. N. Rose in Contrib. U.S. Nat. Herb. vol. i. p. 96.

but the leaves are longer, and are plainly reticulate on the lower surface. According to Kirk, the bark is much eaten by elephants. These specimens are the type of *Vatica africana*, var. *glabra*, Oliv. (Fl. Trop. Afr. vol. i. p. 173).

1032. **Bombax brevicuspe**, *Sprague* [Malvaceae-Bombaceae]; foliolis obovatis breviter obtuse cuspidatis fructibusque obovoideis a ceteris speciebus africanis distinguitur.

*Ramuli* satis graciles, superne 2–3 mm. diametro, subappresse hirsuti, mox glabrescentes. *Folia* ut videtur 5-foliolata; petioli 2–4·5 cm. longi, subappresse hirsuti; foliola obovata, breviter obtuse cuspidata, in basin sensim angustata, 4–8 cm. longa, 2–4 cm. lata, coriacea, glabra, opaca, nervis supra inconspicuis vel prominulis subtus prominulis vel prominentibus; stipulae lanceolatae, acutae, 6–8 mm. longae, extra dense appresse hirsutae. *Capsula* late obovoidea, vel subfusiformi-obovoidea, circiter 7 cm. longa, 4 cm. diametro. *Semina* obovoidea, circiter 9 mm. longa.

Gold Coast. Subinisu, *Thompson*, 10; 12; Imbraim, *Thompson*, 31.

Native name "Nyinakobin," according to Thompson.

1033. **Pelargonium Woodii**, *N. E. Brown* [Geraniaceae]; affinis *P. schizopetalo*, Eckl. & Zeyh., sed foliis duplo longioribus ad rachim pinnatim lobatis parce pubescentibus nec tomentosis, lobis inferioribus ad basin bipartitis differt.

*Caules* non vidi. *Folia* usque 30 cm. longa et 9 cm. lata, pinnatim lobata, ambitu oblonga, versus apicem angustata, obtusa, utrinque tenuiter glanduloso-pubescentia; segmenta imbricata, late cuneato-obovata vel cuneato-orbiculata (inferioribus saepe bipartitis), apice rotundata, breviter 3–6-lobata, crenato-dentata. *Umbellae* longe pedunculatae, 6–8-florae, glanduloso-pubescentes. *Bracteae* numerosae, 5–6 mm. longae, 1·5 mm. latae, lanceolatae, erecto-patentes. *Pedicelli* 5–6 cm. (infra gibbum 1·5–2·5 cm.) longi. *Sepala* 1 cm. longa, 2 mm. lata, linearia, acuta, rubra. *Petala* 1·5–1·8 cm. longa, cuneata, multifido-laciniata, 2 postica straminea, antica carnea.

Natal. Drakensberg Range, *Wood*, 9287.

1034. **Combretum Stocksii**, *Sprague* [Combretaceae]; affine *C. molli*, Engl. et Diels, a quo indumento receptaculi notisque pluribus aliis recedit.

*Frutex* vagans, ramulis gracilibus cinereo-fuscis minute pubescentibus, novellis brunneo-tomentellis lepidotis. *Folia* opposita, ovata vel ovato-oblonga, basi rotundata vel subtruncata, apice acuminata, nervo medio in apiculum producto, 2·5–5·5 cm. longa, 1·2–2·5 cm. lata, ciliolata, supra in sicco brunnea, nitidula, lepidota, nervo medio utrinque pubescente, subtus viridula, dense lepidota, nervis lateralibus utrinque 6–8 prominentibus, crebre reticulata; petioli 3–5 mm. longi, lepidoti, supra dense pubescentes. *Spicae* axillares, in ramulis brevibus ortae, 1–2 cm. longae, 1–1·3 cm. diametro, confertiflorae, rhachi pubescente lepidota. *Bracteae* lineares vel subspathulato-lineares, 1–1·5 mm. longae, supra inferne glabrae, subtus lepidotae, superne longiuscule pilosae. *Receptaculum* inferius oblongo-ovoideum, tetragonum, vix 1 mm. longum, densissime lepidotum, superius infundibuliforme, 3·5 mm. longum, extra lepidotum,

sparse tantum pilosum, intus inferne glabrum, superne villosulum, disco nullo. *Calycis segmenta* depresso-deltoidea, circiter 0·7 mm. longa. *Petala* orbiculari-obovata, 1·7 mm. longa, 1·4 mm. lata, truncato-retusa, apiculata, glabra, viridulo-alba (teste *Stocks*). *Stamina* 4–5 mm. longa. *Fructus* desunt.

Portuguese East Africa. Mozambique, near Mocojo, north of the M'salu River, *Stocks*, 24.

1035. **Microloma spinosum**, *N. E. Brown* [Asclepiadaceae]; species affinis *M. Massoni*, Schltr., sed aphylla, ramulis brevioribus spinosioribus et corollae lobis intra tubum inflexis differt.

*Fruticulus* 30 cm. altus, ramosissimus, aphyllus. *Ramuli* 1·5–3 cm. longi, rigidi, spiniformes, pubescentes. *Flores* laterales, ad nodos fasciculati. *Pedicelli* 2–3 mm. longi, patule pubescentes. *Sepala* 2·5–3 mm. longa, 0·5 mm. lata, angustissime lanceolata, acuminata, patule pubescentia. *Corolla* 3·5 mm. longa, 2 mm. diam., tubularis, 5-angularis, apice 5-gibboso-crenata, extra glabra, intra prope medium fasciculis 5 pilorum deflexis ornata et superne pilis deflexis tenuiter pubescens; lobi 1–1·5 mm. longi, ovati, acuti valde concavi, intra tubum omnino inflexi et ei adpressi. *Folliculi* 2·5–3 cm. longi, lanceolati, attenuato-acuminati, velutino-puberuli.

German South-West Africa. Great Namaqualand, near Aus, 1200 m., *Marloth*, 4662.

1036. **Trichocaulon pictum**, *N. E. Brown* [Asclepiadaceae]; simile *T. cactiformi*, N. E. Br., sed corona non in tubum distinctum inclusa et coronae interioris lobis supra antheras productis differt.

*Caulis* subglobosus vel cylindrico-oblongus, obtusissimus, simplex vel basi tantum parce ramosus, 4–7 cm. longus, 4–5 cm. crassus, irregulariter tessellato-tuberculatus, glaber, tuberculis 6–10 mm. diam. obtusissimis primum minute apiculatis. *Flores* fasciculati, erecti, fasciculis 2–4-floris. *Pedicelli* 2 mm. longi, glabri. *Sepala* 1–1·5 mm. longa, late ovata, acuta, glabra. *Corolla* 9 mm. diam., glabra, extra laevis, intra minute rugulosa, glabra, pallida (albida vel lutescens ?) punctis parvis et lineis brevibus numerosis purpureo-brunneis notata; tubus late patelliformis; lobi patentissimi, 2·5 mm. longi, 3 mm. lati, late deltoideo-ovati, acuti. *Corona exterior* 5-loba, lobis 3-fidis 1·5 mm. longis fere ad sinus corollae attingentibus pallidis purpureo-brunneo-maculatis. *Coronae interioris* lobi 1·5 mm. longi, lineares, acuti, antheras excedentes apicibus connivento-erectis, pallidi, purpureo-brunneo-marginati.

South Africa. Little Namaqualand, *Marloth*, 4596.

1037. **Chironia (Plocandra) uniflora**, *A. W. Hill* [Gentianaceae-Chironieae]; species *C. Verdickii*, De Wildem., proxima; differt caulibus eramosis unifloris corollae lobis latioribus.

*Suffrutex* erectus, glaber. *Caulis* circa 30 cm. altus, 4-gonus, eramosus. *Folia* numerosa, anguste ovata, elliptica vel lanceolata, opposita, apice acuta vel acuminata, basi angustata, margine reflexa, 2–3 cm. longa, 3–6 mm. lata. *Flos* solitarius, terminalis. *Calyx* alte 5-sectus, 1–3 cm. longus, lobis ovato-lanceolatis acuminatis dorso paullo alatis. *Corolla* alba, circa 2 cm. longa, 5-loba, tubo anguste campanulato calyce breviore, lobis ovato-ellipticis acutis 1·5–1·6 cm. longis 6 mm. latis. *Stamina* parum sub loborum

sinubus inserta; antherae rectae, 8 mm. longae, filamentis 2·5 mm. longis. *Ovarium* anguste oblongum, 7 mm. longum; stylus 1·1 cm. longus. *Capsula* ignota.

Tropical Africa. Congo: Kundelungen; in damp places, *Kässner*, 2784! (Herb. Mus. Brit.)

This species is distinct in having its tall erect stems unbranched above and terminated by a single white flower. In the structure of the flower and general appearance of the plant it comes closest to *C. Verdickii*, De Wildem. The calyx in the two plants is very similar, but the petals of *C. uniflora* are broader and shorter, and like that species it recedes from the other Plocandras in having straight anthers. In *C. angolensis*, to which this plant also shews some resemblance, the anthers are twisted.

1038. **Lycium leptacanthum**, *C. H. Wright* [Solanaceae-Atropeae]; species *L. arenicolo*, Miers, et *L. oxyclado*, Miers, affinis, ab hoc corollae lobis ovatis, ab illo floribus pentameris differt.

*Rami* tenues, albo-cinerascentes, laterales apice spinescentes. *Folia* fasciculata, oblanceolata, obtusa, 8 mm. longa, 1·5 mm. lata, glabra. *Flores* solitarii, pentameri; pedicelli filiformes, 5 mm. longi. *Calyx* 5 mm. longus, apice pubescens; tubus campanulatus; lobi breves, irregulares. *Corolla* infundibuliformis; tubus quam calyx paullo longior; lobi ovati, 4 mm. longi, 2 mm. lati, breviter denseque ciliati. *Stamina* ad medium corollae tubi affixa; filamenta inaequalia, 2 exserta, 3 inclusa. *Discus* parvus. *Ovarium* subglobosum; stylus longe exsertus; stigma capitatum.

South Africa. Cape Colony: Grahamstown, *Miss E. Cherry*, 934.

This species possesses characters so intermediate between *L. arenicolum* and *L. oxycladum* as to suggest that it may be a hybrid between them. The internal tissue of the corolla-tube below the insertion of the stamens breaks down at an early period and causes the tube to appear double.

1039. **Tragia** (**Tagira**) **Schweinfurthii**, *Baker* [Euphorbiaceae-Crotoneae]; species *T. Hildebrandtii*, Muell.-Arg., proxima, sepalis floris foeminei apice 3-partitis differt.

*Caulis* simplex, erectus, 10–15 cm. altus, dense pilosus nec pilis urentibus hispidus. *Folia* sessilia, lanceolata, acuta, margine serrata, basi rotundata, 4–5 cm. longa, 1·5–2 cm. lata, subcoriacea, utrinque dense pilosa; stipulae lineares, rigidae. *Racemi* breves, oppositifolii vel terminales. *Sepala* floris foeminei 6, pilosa, haud indurata, apice 3-partita lobis lanceolatis, nonnunquam lobulis lateralibus 1–2 parvulis secus rhachin additis. *Capsula* breviter hispida.

Tropical Africa. Nile-land: Dar Fertit, *Schweinfurth* III., 152!

1040. **Neodregea**, *C. H. Wright*, gen. nov. [Liliaceae-Anguillarieae]; *Dipidaci*, Laws. ex Salisb., affinis, carpellis apice divergentibus ut in *Veratro*, Linn., differt.

*Bulbus* tunicatus. *Folia* caulina, alterna, sessilia. *Flores* pauci in spicam terminalem laxe dispositi. *Perianthii* segmenta 6, libera, breviter unguiculata. *Filamenta* filiformia; antherae parvae, dorsifixae. *Ovarium* profunde trilobum, carpellis apice divergentibus, stylis distantibus; ovula in quoque loculo circa 6, biseriata.

**N. Glassii**, *C. H. Wright* (species unica).

*Herba* 5 cm. alta. *Bulbus* ovoideus, 6 mm. diametro, tunicis obscure brunneis laevibus, membranaceis vestitus. *Caulis* erectus, filiformis, siccitate sulcatus, viridis. *Folia* 2, lineari-lanceolata, acuminata, 3 cm. longa, 4 mm. lata, glaberrima, membranacea; folium inferius longe vaginans, superius amplexicaule quam inferius minus. *Spica* floribus 2–4 distantibus composita; bracteae foliis similes, sed multo minores. *Perianthii* segmenta patentia, 7 mm. longa, 0·3 mm. lata, angustissime lanceolata, in parte superiore fere filiformia, basi supra unguem auriculata. *Stamina* 2 mm. longa; filamenta filiformia; antherae subglobosae, dorsifixae. *Ovarium* 2 mm. longum, viride; styli 3, subulati, ad angulos apicales exteriores ovarii affixi; stigmata punctiformia. *Capsula* loculicide dehiscens. *Semina* lenticularia, brunnea.

South Africa. Cape Colony: Albany Division, near Grahamstown, *Glass*, 674; Port Elizabeth Division, in damp ground, Cradock Place and Baakens River, *J. L. Drege*.

A fruiting specimen of this plant was received at Kew from Mr. James Glass in 1896, but flowers remained unknown until the recent arrival of Mr. J. L. Drege's specimens from Dr. Schönland, Director of the Albany Museum, Grahamstown. This species has the habit of a dwarf *Ornithoglossum*, the flower (except the ovary) of *Androcymbium*, and the ovary of *Veratrum*, but in the sum of its characters it agrees most with *Dipidax*. Although the perianth-segments are so narrow, yet they bear auricles just above the claw, such as are found more highly developed in the genus *Androcymbium*, and just indicated in *Dipidax*. The pistil at first sight appears to be apocarpous on account of the deep lobing of the ovary and the apical divergence of the carpels.

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## XLI.—KOKOTI.

(*Anopyxis ealaensis*, Sprague.)

T. A. Sprague and L. A. Boodle.

In May 1906 specimens of a large timber tree bearing the native name "Kokoti" were received at Kew from Mr. A. E. Evans, then Curator of the Botanic Station, Aburi, Gold Coast. The material, which was collected at Tarkwa, Gold Coast Colony, consisted of a branchlet bearing simple stipulate leaves, ternate at the nodes, and axillary, peduncled, dichasial or trichasial cymes of flowers. The most striking feature of the flower was a staminal tube resembling that of the *Meliaceae*, and it was at first supposed that "Kokoti" represented an undescribed genus of that family. When a full description of the species had been drawn up, however, it became evident that "Kokoti" presented a combination of characters which was unparalleled in *Meliaceae*: simple, ternate, stipulate leaves; gamosepalous calyx with reduplicate-valvate lobes, completely enclosing the corolla in the bud; petals trifid, inflexed in bud. It was eventually decided that the most natural position for "Kokoti" was in the family *Rhizophoraceae* near the genus *Macarisia*, with which it agreed in habit, inflorescence, and

the general nature and aestivation of the flower, as well as in most of the anatomical characters of the leaf and stem. The only important differences noticed between "Kokoti" and *Macarisia* were that the former had hypogynous flowers and a staminal tube, and the latter perigynous flowers and stamens free from one another. As both perigyny and epigyny are known in *Rhizophoraceae*, however, the hypogynous flowers of "Kokoti" would not exclude it from that family. There remained the union of the filaments into a complete staminal tube, but this, though very striking, could hardly weigh against the great general similarity in vegetative and floral characters. It is interesting to note that *Macarisia* was placed doubtfully in the *Meliaceae* by Meissner (Gen. p. 47), but all recent authors are agreed that it is Rhizophoraceous.

Comparison with the description of *Anopyxis*, Engler (*Engl. & Prantl, Nat. Pflanz. Nachtr.* ii. p. 49) suggested that "Kokoti" might be referable to that genus. *Anopyxis* was originally described as a section of *Macarisia* by Pierre (*Bull. Soc. Linn. Par.* n.s. p. 74), who based it on a specimen collected in the Gaboon by Klaine. Klaine's specimen included fruits but no flowers, whereas the flowers of "Kokoti" were known, but not the fruits. It was therefore impossible to ascertain whether *Anopyxis* and "Kokoti" were congeneric without actual comparison of the types. Owing to Pierre's death, however, his herbarium was temporarily inaccessible, and the description of "Kokoti" was accordingly held back until an opportunity should occur for examining the type of *Macarisia Klaineana*, Pierre (*Anopyxis Klaineana*, Engl.).

In the meantime De Wildeman described what is obviously the same tree as "Kokoti" as the type of a new genus and species of *Meliaceae*, *Pynaertia ealaënsis* in *Ann. Mus. Congo*, sér. 5, vol. ii. p. 262, t. 84. "Kokoti" has a sparingly pilose style, and *P. ealaënsis* is described as having a glabrous style, but there is no other difference. The stipules of *P. ealaënsis* are not figured or described, having evidently fallen off.

Pierre's herbarium was bequeathed to the Natural History Museum, Paris, and it has now been possible, through the courtesy of Prof. H. Lecomte, to examine the type of *Anopyxis Klaineana*. Comparison of this with "Kokoti" (*Pynaertia ealaënsis*) leads to the conclusion that the two are congeneric, but specifically distinct. The branchlets, stipules, buds, and the texture and venation of the leaves are almost identical, but the leaves of *A. Klaineana* are oblong and those of *P. ealaënsis* obovate or elliptic.

Little doubt now remains, therefore, that *Pynaertia* belongs to the *Rhizophoraceae*, and is congeneric with *Anopyxis* :—

1. The inflorescence and flowers of *Pynaertia* suggest affinity with *Macarisia*.

2. The fruit of *Anopyxis* is almost the same as that of *Macarisia*.

3. The external vegetative characters of *Pynaertia ealaënsis* and *Anopyxis Klaineana* are almost identical, apart from the shape of the leaves; and the anatomical characters of these two plants also show close agreement.

4. The vegetative characters, both external and anatomical, indicate affinity with *Macarisia*.

A revised description of the genus *Anopyxis* is now given, followed by an account of the leaf and stem anatomy of "Kokoti" (*Anopyxis ealaënsis*).

Anopyxis, Engl. in Engl. & Prantl, Nat. Pflanz. Nachtr. ii. 1900, p. 49.

*Macarisia* sect. *Anopyxis*, Pierre in Bull. Soc. Linn. Par. n.s. 1898, p. 74.

*Pynaertia*, De Wild. in Ann. Mus. Congo, sér. 5, vol. ii. 1908, p. 262, t. 84.

*Flores* hypogyni. *Calyx* gamosepalus, campanulatus; lobi 5, reduplicato-valvati. *Petala* 5, apicibus tridentatis in alabastro intra tubum staminalem inflexis. *Stamina* 10, monadelpha; tubus filamentorum cylindricus, apice 10-crenulatus; antherae inter crenulas sessiles. *Ovarium* sessile, depresso-globosum, 5-loculare; ovula pro loculo 2, collateralia, pendula. *Capsula* 5-locularis, loculicida; semina pro loculo 2, superne arillo membranaceo alata. Arbores altae, foliis ternatis vel quaternatis, stipulis interpetiolaribus solitariis; dichasia vel trichasia axillaria, pedunculata.

1. **A. Klaineana**, *Engl.* l.c.

*Macarisia Klaineana*, Pierre, l.c.

Folia oblonga, obtusa vel breviter obtuse acuminata, 11–13 cm. longa, 3·3–5 cm. lata; nervi laterales 12–13.

Gaboon. *Klaine*, 1308.

2. **A. ealaënsis**, *Sprague*. *Pynaertia ealaënsis*, De Wild. l.c.

Folia obovata vel elliptica, apice rotundata vel rotundato-cuneata, 6–11·5 cm. longa, 3–5 cm. lata; nervi laterales circiter 10.

Gold Coast. Tarkwa, *Evans*, 4.

Congo Free State. Eala, *Pynaert*, 1024 (ex De Wildeman).

According to Mr. H. N. Thompson, this species occurs in most of the forests of the Gold Coast Colony, where it is an important timber tree. Native name "Kokoti."

The anatomical characters of the leaf and stem in "Kokoti" are as follows :—

Leaf: Occasional solitary crystals of oxalate of lime in epidermal cells; stomata on lower side of leaf, variable in type, the arrangement of the adjacent cells being irregular, or approaching Cruciferous and Rubiaceous types; hypoderm (of 1–2 layers) on the upper side of the leaf; mucilage and tannin in many cells of the mesophyll; smaller veins embedded in the mesophyll, and accompanied by sclerenchyma above and below; midrib with a closed, somewhat flattened vascular ring; vascular system of petiole similar, but open on the upper side; hairs simple, unicellular.

Stem: Periderm superficial; inner walls of many of the cork-cells thickened; occasional sclerotic cells in the cortex; pericycle containing a sub-continuous ring of sclerenchyma and sclerotic cells; no hard bast in the phloem; wood-vessels with simple and also scalariform perforations; walls between vessels and parenchyma usually with large simple or slightly bordered pits; wood-fibres with bordered pits; medullary rays 1–2 cells broad.

The anatomical characters described above agree satisfactorily with those of the *Rhizophoraceae—Legnotideae*. A special comparison was made between "Kokoti" and *Macarisia pyramidata*,

Thouars,* and it was found that these two plants agreed in most of their anatomical characters. The chief points in which the latter species differs from "Kokoti" are: sclerenchyma on the upper side only of the smaller veins; vascular "ring" of the midrib open on the upper side; wood-vessels only rarely having scalariform perforations; cork-cells mostly thin-walled, thickening of inner wall only seen in a few cells; crystals of oxalate of lime in certain cells of both upper and lower epidermics of the leaf, instead of only in the lower epidermics, as in "Kokoti."

From the anatomical agreement it is evident that the affinity of "Kokoti" is with *Macarisia* and the *Legnotideae*. The close affinity between "Kokoti" and *Anopyxis Klaineana* is supported by their anatomical structure, which shows only trivial differences.

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## XLII.—MARINE ALGAE OF THE WEST OF IRELAND.

A. D. Cotton.

In April of the present year a Natural History survey was commenced of Clare Island and the adjoining mainland in the county of Mayo. The locality was selected on account of its relatively primitive nature, two of the principal objects of the investigation being—(*a*) a detailed study of the fauna and flora of a promising portion of the West Coast of Ireland; and (*b*) a comparative study of the fauna and flora of Clare Island with those of the mainland, with a view of elucidating the history of the fauna and flora of the island.

The survey will extend over a period of two or three years, and will be carried out under the leadership of Mr. R. Lloyd Praeger by means of monthly trips, except in the winter, when special visits will be arranged as occasion may require. A laboratory with necessary apparatus has been fitted up on the island, and there is hotel accommodation for a party of about twelve. Workers are still required in certain branches of both Zoology and Botany; but the services of a large number of specialists have been enlisted, and there is every prospect of the work being carried out in a thorough manner.

The algal flora of the West and South-West of Ireland is of special interest, and the neighbourhood of Clare Island is particularly suitable as a centre for investigation. In anticipation of the flora being rich, and considering the extent of ground to be worked, it was highly desirable that the study of the marine algae should be put in hand at once, the writer therefore joined the first collecting party which proceeded to Clare Island immediately before Easter. In addition to the ordinary work of the survey, opportunity was taken of enriching the Kew collections, by gathering and drying a number of specimens for the Herbarium, special

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* For some of the anatomical features *Macarisia lanceolata*, Baill. was used instead of *M. pyramidata*.

attention being given to groups which are at present poorly represented. Material in formalin, of parasitic and endophytic algae, and of other species which cannot properly be examined in a dried state, was also obtained.

The first visit, necessarily more or less of a preliminary character, may be regarded as entirely satisfactory, both as to the suitability of the site for algal exploration and as to the amount of work that was accomplished.

Various types of collecting ground are met with. On Clare Island itself the rocky exposed shores offer a typically "exposed" flora. On the mainland such channels as Achill Sound afford quiet but fully saline conditions, where a "sheltered" type of flora exists, the growth here being often exceedingly luxuriant. Clew Bay, with its innumerable islands and sand banks, presents another and different type of vegetation, which may be termed a sand-bay flora, where every transition from exposed to sheltered conditions may be found. Land-locked bays, such as Bellacragher, furnish brackish water, where a fourth and characteristic vegetation obtains. Muddy ground with mud-loving species is also supplied in many parts of Clew Bay. To obtain a detailed knowledge of the algae of such a district, each of these types of collecting ground should be examined thoroughly, and that as often as possible throughout the year. Many of the smaller algae are very transient in their appearance, so that unless frequent collections be made, their presence is liable to be overlooked. It is thus manifest that, though an endeavour will be made to visit the Clare Island district as often as possible, any collections and observations by other botanists would be of great assistance.

The following is a brief account of the algological investigations during the Easter visit, the work on the island being first referred to, and afterwards that on the mainland :—

Nine days were spent on Clare Island, during which a general idea of the marine flora was obtained, and several positions were selected for the study of distribution. Special attention was paid to the last-named subject, as it is a branch of algology which has been almost entirely neglected in this country.

The shore on the west side of the island is practically inaccessible on account of the precipitous nature of the cliffs, but on the south and east sides there is excellent ground for collecting, though the frequency of swells and gales from the Atlantic make this sometimes a difficult, if not impossible, task. When such is the case, compensation may be found in the presence of a big "wash-up." The shores consist of rugged rocks and boulders, wide expanses of flat rock with various degrees of wave exposure, occasional lagoon-like areas of shallow water, and numerous deep rock pools ; whilst caves, sheltered creeks, and sandy bays may also be found. The water is clean, and apparently pure, the diatomaceous coating which frequently disfigures the Red Seaweeds being little in evidence. On the island the work was entirely confined to the study of the littoral flora, the investigation of the benthos being postponed until the summer. The littoral vegetation is plentiful and robust, although as usual on exposed coasts a dwarf growth of some species occurs.

With regard to the distribution of the larger algae, the factors of first importance would seem to be—(1) the temperature of the water ; (2) the salinity of the water ; and (3) the physical nature of the coast. When dealing with an area such as Clare Island, the conditions dependent upon these three factors are fairly uniform, and then the distribution of the algae and algal associations appear to be principally affected by conditions of illumination, desiccation, and exposure to waves and rough water. The respective influence of each of these may, to a certain extent, be readily observed. The effect of light may be studied in shady situations, such as caves or deep gulleys. The importance of not being exposed to dry air may be observed by means of rock pools, when it will be noted that sublittoral algae and species which are rarely uncovered by the tide can occur in pools nearly up to high-water mark, whilst the effect of breakers and rough water will be detected on passing from a fully exposed to a sheltered part of the shore. The influence of the first two factors is, no doubt, intimately connected, as sublittoral species have of necessity a diminished amount of light, but the presence of deep water algae in dark and partly dry caves would suggest that light, and not air-exposure, is often the determining factor.

The collections made on Clare Island contain numerous microscopic species. Several of these are new to Ireland, and quite as many supplied the first specimens from the British Isles for the Herbarium. A few species obtained were entirely unrepresented at Kew.

Turning now to the work on the mainland, one day at Mallaranny was all that could be spared for studying the sand-bay flora of Clew Bay. The littoral vegetation here is very meagre compared with that of the rocky coast of Clare Island, but a number of shallow pools and low rocks exist which support a flora characteristic of such a shore. Clew Bay is very suitable for dredging, and it may be confidently expected amply to repay careful investigation of the benthos.

A trip to Bellacragher Bay, an arm of Blacksod Bay, for the purpose of examining the brackish flora, was of special interest. At the particular portion of the bay visited, a Brown and Green Seaweed vegetation was much in evidence, whilst the Red Algae (*Florideae*) were almost entirely absent. A most attractive piece of work in such localities is to trace the gradual appearance of the different species of *Florideae*, as the more saline areas are approached. The flora of Bellacragher Bay is typical of a land-locked arm of the sea. It is largely developed in many of the Scotch lochs, and is well worthy of a more detailed investigation than it has hitherto received.

In striking contrast to Bellacragher Bay was the profusion of *Florideae* in parts of Achill Sound. Protected at each end from the open sea, yet feeling the full effects of the tide, the floridean vegetation in April was magnificent. Much of the Sound is completely uncovered at low tide, and the channels of rapidly-flowing water which are left, possessed in places a most luxuriant vegetation. Some very fine specimens were collected here for the Herbarium.

It is well-known that the phanerogamic flora of the West of Ireland presents features of remarkable interest. There is the striking mixture of South-west European plants with those characteristic of North America. *Erica mediterranea*, *E. Mackaii*, *Arbutus Unedo*, *Saxifraga Geum*, and *Pinguicula grandiflora* may be taken as representatives of the first group; whilst *Eriocaulon septangulare*, *Sisyrinchium angustifolium*, and *Spiranthes Romanzoffiana* are examples of the second. In addition to these there is the remarkable sight of such alpine plants as *Gentiana verna*, *Dryas octopetala* and *Euphrasia salisburgensis* growing in immense quantities right down to sea-level, and that in a warm humid climate. Lloyd Praeger has stated that such a startling mixture of types is not to be found elsewhere in Europe. In the case of the marine algae the same overlapping of northern and southern elements is, to a certain extent, known to exist, a fact which was strikingly verified in at least one instance during the Easter visit.

The explanation of these peculiar phenomena is one of the interesting problems before the biologists at Clare Island. It is too much to hope that a solution of such intricate problems will be effected by a local survey, but if only a more detailed account of facts be obtained, much good and important work will have been accomplished.

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## XLIII.—MISCELLANEOUS NOTES.

Mr. Robert Gill, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, a Curator in the Agricultural Department of Southern Nigeria.

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**Bust of Darwin.**—The centenary of the birth of Darwin has been marked by the presentation to Kew of a bronze bust of this very distinguished naturalist. For this gift the institution is indebted to the generosity of the Bentham Trustees. The bust is the work of Mr. Horace Montford; it has been placed in Museum No. I., and was put in position on June 23, 1909, the central day of the Darwin Centenary celebration at Cambridge. At this celebration Kew was officially represented by the Director, who, on the same day, presented to the University the following address:—

Universitati Cantabrigiensi

S. P. D.

Quod etiam nos ad ferias natales viri clarissimi scientiarumque naturalium laude florentis Caroli Darwin concelebrandas invitastis gratias quam maximas vobis agimus. Nobis enim in honore praecipuo habendus vir quam eruditus tam liberalis, beneficiorum cujus ac munificentiae gratia botanices studiosi gaudent opus momenti maximi, Index Kewensis Plantarum Phanerogamarum nuncupatum, in usum publicum confectum atque editum esse.

**Chinese Bamboo Ropes.**—To the large and varied collection of articles made of bamboo contained in Museums Nos. II. and III., an interesting addition has recently been made in the form of a series of bamboo ropes. These have been presented by Mr. S. T. Dunn, Superintendent, Botanic and Forestry Department, Hong Kong. The ropes, which are made of split bamboo either twisted or plaited, vary in circumference from 1 ft. 6½ ins. to 1 in., and are employed for tying poles to the sides of junks and for towing purposes.

The following details accompanied the specimens :—

"The important industry of the lower part of the Yuen Fu River is in the cultivation of bamboos. The middle and lower slopes of the mountains are densely clothed in many parts with bamboo groves, and the ingenuity which is employed in transporting the cut bamboos from the mountains to Foochow is quite astonishing.

"Where there is water, even if it be only a small mountain stream, it is cleverly guided between ridges of shingle so as to provide a continuous channel, perhaps only a few inches deep, along which the bamboos can float. Where there is no water, smooth slides are made through the groves on the mountain sides, or on very steep rocky ground bamboo brackets are driven into the ground over which the bundles can be easily dragged.

"Once down to the main stream the bamboos are lashed together so as to form large rafts which can be poled or sailed down to the tidal waters and so to the market at Foochow.

"The usual means of progression of the passenger boat was by tracking.

"The width of the river Min, and the fact that the only available channel was often separated from the shore by jagged projections of rocks, rendered this operation one of considerable difficulty, and the highly specialized devices which have been evolved, doubtless by centuries of combat with these natural difficulties, are interesting to see. In the first place, the hemp ropes used largely in China for other purposes have proved quite useless for tracking because they would be frayed through in a very short time when strained, as is often necessary, over the rough granite rocks in the river bed.

"The rope that is used is made of thin strips of bamboo with the hard glazed side outward, plaited together so as to form a cord of about three-quarters of an inch in diameter. Should this become bruised by an accident during the day, the injured strips are removed in the evening and replaced by new ones threaded into the rope exactly in their place. It will give some idea of the strength of this tow rope when I say that the weight of 30 men pulling at one end was not sufficient to break it.

"I have been unable, so far, to identify the bamboo which is used in the manufacture of the tow ropes. It is called 'Mieng Deuk' by the river men."

With regard to the manufacture of these ropes, Mr. R. A. Currie, of the Chinese Imperial Customs Service, Swatow, wrote to Mr. Dunn under date October 12, 1908, as follows :—

"I have often seen the men making the plaited bamboo at Wahu on the Yangtze. The plait looks like what sailors call 'round sennit' or 'coach-whipping,' which is made with any even number

of ends. At Wahu they used to put up a tower of bamboo scaffolding about 50 ft. high, with a platform on top. Sometimes one man, but usually two, stood on this platform, their hands protected by enormous hide gloves and their bodies by hide aprons, plaiting the rope out of bamboo strips. The strips are prepared by men below and bundles of them are handed up as required. As the rope is plaited it passes down through a hole in the middle of the platform. When these bamboo ropes are worn out they are dried, cut into lengths of about 3 feet, and used as torches or for fuel. Most of these ropes are cored; sometimes the core is made of bamboo strips laid side by side, sometimes twisted, and were, in the best, of round sennit like the outside."

J. M. H.

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**Presentations to Museums.**—The following miscellaneous specimens have recently been received :—

Price's Patent Candle Co., Ltd.—Series of products from the Cocoa Nut and African Oil Palms.

Mr. J. Burtt Davy, F.L.S., Department of Agriculture, Transvaal.—Samples of rubber from *Asclepias stellifera*, prepared by Mr. Ferraz.

Mr. F. W. Yates, Santa Barbara, California.—Photographic portrait of the late Dr. Lorenzo Gordin Yates.

Mr. S. T. Dunn, F.L.S.—Sheaths of a Bamboo known as 'Maw Chuk,' used for paper-making and as a covering for cushions, &c. Also sheaths of a Bamboo known as 'Lak Chuk,' used for basket-work and as wrapping for small parcels.

Linnean Society of London.—A collection of miscellaneous vegetable products, including samples of rubber, fruits, &c., from the collection of the late Mr. S. W. Silver.

Mr. W. H. Johnson, F.L.S., Director of Agriculture, Companhia de Moçambique, Beira, Portuguese East Africa.—Section of stem of the 'Makruss' or 'Zimbiti' tree (*Androstachys Johnsonii*). See *Kew Bull.* No. 5, 1909, p. 201.

Acme Flooring and Paving Co., Ltd., Victoria Park.—Flooring blocks of various woods, including Jarrah, Oak, Teak, &c.

Messrs. John Jackson & Co., West Croydon.—Plants of Black and White varieties of Mint.

Mr. H. N. Ridley, F.R.S., Director, Botanic Gardens, Singapore. —Fruits of *Raphia Hookeri*.

Dr. F. H. H. Guillemard, Trumpington, Cambridge.—Box made of Birch bark from Central Kamschatka. Photograph of monument erected to the memory of Rumphius in Amboina.

J. M. H.

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**Revision of Alexander Prior's Jamaica Collection.**—In the *Kew Bulletin* for 1903, p. 32, Dr. Alexander Prior's bequest of his herbarium and botanical library to Kew was recorded. Special reference was made to his large collection of Jamaica plants made in 1849 and 1850. As these plants were not always authentically

named, or in part not named at all, Professor Urban, of Dahlem-Berlin, the greatest living authority on the flora of the West Indies, was applied to and asked to undertake the revision of the collection. To this proposition he very generously agreed, and the collection was submitted to him in instalments. The work has now been completed. It is of much importance to have the authority of Professor Urban for the names attached to the species of this collection, and in recognition of his kindness and courtesy a set of duplicates, selected from Alexander Prior's Jamaica collection, is being transferred to the "Krug et Urban Herbarium" of West Indian plants, which is deposited in the Museum of the Botanic Gardens at Dahlem-Berlin.

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**Botanical Magazine for July.**—*Coelogyne cenusta*, Rolfe, is a close ally of *C. Dayana*, Reichb. f., but it is a smaller plant, and is distinguished from all the species allied to it by the large size of the anterior lobe of the labellum as compared with the lateral lobes. It is a Yunnan species, whence it was introduced a few years ago by Messrs. F. Sander & Sons, of St. Albans, and the plant figured flowered in the Royal Botanic Gardens, Glasnevin, in 1904. *Aloe rubrolutea*, Schinz, is a native of the Kalahari Desert and German South-west Africa, and has been introduced into European gardens by Mr. Karl Dinter. It is a striking species, with long racemes of bright red and yellow flowers, which are 1¼ in. long. The figure was prepared from a specimen which flowered at La Mortola in November 1907, probably for the first time in Europe. *Rubus canadensis*, Linn., is widely distributed in Eastern North America, and is popularly known as the "Thornless Blackberry." It resembles in habit the common Raspberry, but has black fruits similar to those of the Blackberry. At Kew, where a plant presented by Professor Sargent of the Arnold Arboretum has been grown since 1902, it has borne the name of *Rubus Millspaughii*, proposed for it by Dr. Britton. *Pyrus Ringo*, Wenzig, is of Japanese origin, and is believed by Mr. C. K. Schneider to represent a cross between *P. spectabilis* and some form of the common apple. It has been in cultivation at Kew for many years, and as an ornamental tree, with its abundant pendulous fruits which become bright yellow in the autumn, it has no equal in the genus. *Mahonia arguta*, Hutchinson, was described for the first time last year, though it has been cultivated at Glasnevin for upwards of thirty years; otherwise its history is unknown, but it is presumed to be a native of Central America, from the fact of its affinity to *M. paniculata*, Oerst., and other Central American species. Its slender arching panicles of pale yellow flowers are a foot long or more.

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**Botanical Magazine for August.**—*Caralluma Nebrownii*, Berger, is nearly allied to *C. lateritia*, N. E. Br., but differs in having much longer pedicels, a more rugose corolla of a blackish-crimson colour flecked with very small yellowish spots on the disk and at the base

of the lobes instead of a uniform brick-red. The corona is also larger. This plant is also allied to *C. huillensis*, Hiern, and *C. lutea*, N. E. Br. *C. Nebrownii* was discovered by Mr. Dinter near Barmen, in German South-West Africa, whence it was sent to the late Sir Thomas Hanbury at La Mortola. The plant figured flowered there in July, 1907, and again in November, 1908, when specimens were forwarded to Kew. *Cycnoches densiflorum*, Rolfe, is an interesting plant on account of the great diversity between the sexes, which, as in the present instance, are occasionally borne together upon the same pseudo-bulb. The male flowers have membranous perianth segments, yellow with red spots, and the labellum is reduced to a small circular disk surrounded by a number of clavate marginal appendages ; the column is long and slender. In the female flowers the perianth segments are greenish yellow and fleshy, the labellum is a large white ovate fleshy body, and the column is very short and stout. The plant was collected by Mr. Birchenall at Simacota, Colombia, and flowered in the collection of the Rev. J. C. B. Fletcher, Mundham Vicarage, Chichester, in November, 1908. An account of the genus *Cycnoches* was given in the last number of the *Bulletin*, pp. 268–277. *Erlangea tomentosa*, S. Moore, appears to be a polymorphic species rather widely spread in Tropical Africa. *E. fusca*, S. Moore, is the nearest ally, from which it is readily distinguished by the bright green leaves and the scariously edged involucral bracts. The plant figured was presented to Kew in April, 1907, by Mr. R. Diespecker, Adstock House, Winslow, by whom it was raised from seed. It has formed a shrub about five feet in height, resembling some Eupatoriums, and flowers freely and continuously during winter and spring. *Spiraea Henryi*, Hemsl., was one of the most beautiful deciduous shrubs in flower in mid-June, 1908. Belonging to the section *Chamaedryon*, it is most closely related to *S. canescens*, D. Don, and *S. Wilsoni*, Duthie. It was discovered by Mr. A. Henry, in Hupeh, near Ichang, in 1885, but for its introduction to cultivation we are indebted to Messrs. J. Veitch & Sons, whose collector, Mr. E. H. Wilson, found it at Hupeh in 1900. According to Mr. Henry, the leaves are used by the poorer natives of Central China as a substitute for tea. *Agave Wrightii*, J. R. Drumm, the subject of this plate, is a member of the *Littaea* section of the genus, and is allied to *A. angustissima*, Engelm., and *A. geminiflora*, Scannag. The plant now figured was acquired for Kew from the collection of Mr. T. H. Kellock in 1903. Some confusion connected with the name *A. geminiflora* is cleared up in the discussion on the subject of this figure.

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**Vegetation of the Coast Region of Belgium.**—Under the auspices of the Ministry for Agriculture the first part of a comprehensive work on the composition and distribution of the vegetation of Belgium has been issued from the Royal Botanic Garden of Brussels. The work has been undertaken by Professor Ch. Bommer and Professor J. Massart, and will comprise about 400 plates, about 1 foot by 1 foot 4 inches, divided into five parts : I. Districts Littoraux et Alluviaux ; II. Districts Flandrien et

Campinien ; III. Districts Argilo-sablonneux et Cretacé ; IV Districts Calcaire et Jurassique ; V. District Ardennais. Part i., by Prof. Massart, consists of an octavo volume of tables, maps, and 82 views, about $2\frac{1}{2}$ inches by $4\frac{1}{2}$ inches, reproduced from photographs, and a folio volume of 86 plates, 18 inches by $22\frac{1}{2}$ inches, outside measurement, and weighing about 15 lbs. The dimensions and weight are given because they are the only objections to an otherwise excellent work. It is true that they give scope for a very magnificent series of photographs, but for all practical purposes, Karsten and Schenck's "Vegetationsbilder," about a third of the size, are sufficiently large for educational purposes, since they can be more easily handled and more easily stowed.

Apart from this objection there is nothing but praise for this great undertaking, and the part treating of the coast vegetation, both natural and artificial, is highly interesting and instructive, and will serve as a foundation for future comparisons. Maps and photographs of different dates illustrate the gain of land and the increase in height of the sandbanks or dunes, whilst others show the ravages caused by unusually high spring tides and sea storms. In spite of all precautions inundations are sometimes very disastrous. *Ammophila arenaria* is extensively planted in the blown sand, which is prepared for the purpose by rows of deeply embedded thorn branches. Potatoes are one of the earliest cultivations in the reclaimed land. Pines and poplars are the principal trees planted for shelter. The general title of the work is "Aspects de la Végétation en Belgique," and the special title of part i. is "Essai de Géographie Botanique des Districts Littoraux et Alluviaux de la Belgique." It may be added that much of the material had previously appeared in the "Bulletin de la Société Royale de Botanique de Belgique," vol. xliii. and onward.

W. B. H.

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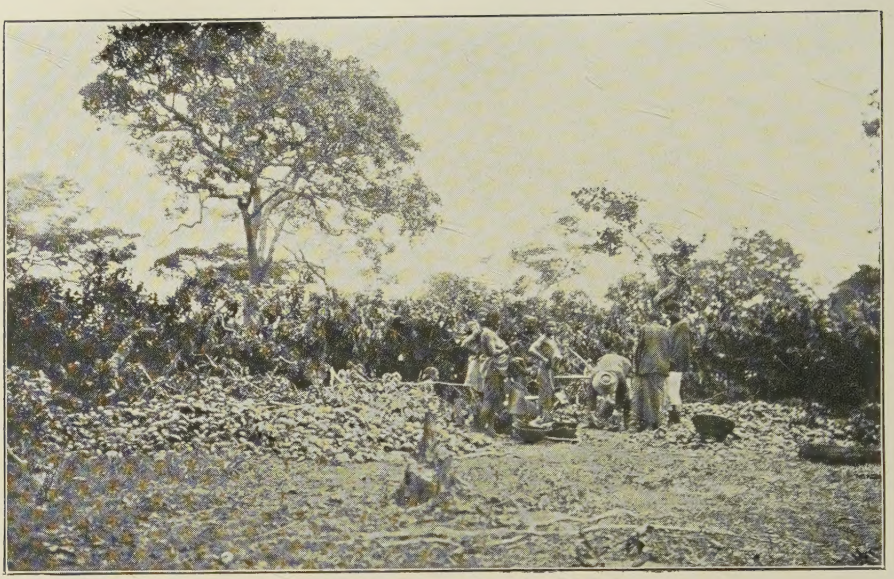
**Para rubber.**—Mr. W. H. Johnson has published a second edition of his book "The Cultivation and Preparation of Para Rubber" which has been rewritten and considerably enlarged. There are numerous illustrations. The subject matter is collected together in fifteen well arranged chapters.



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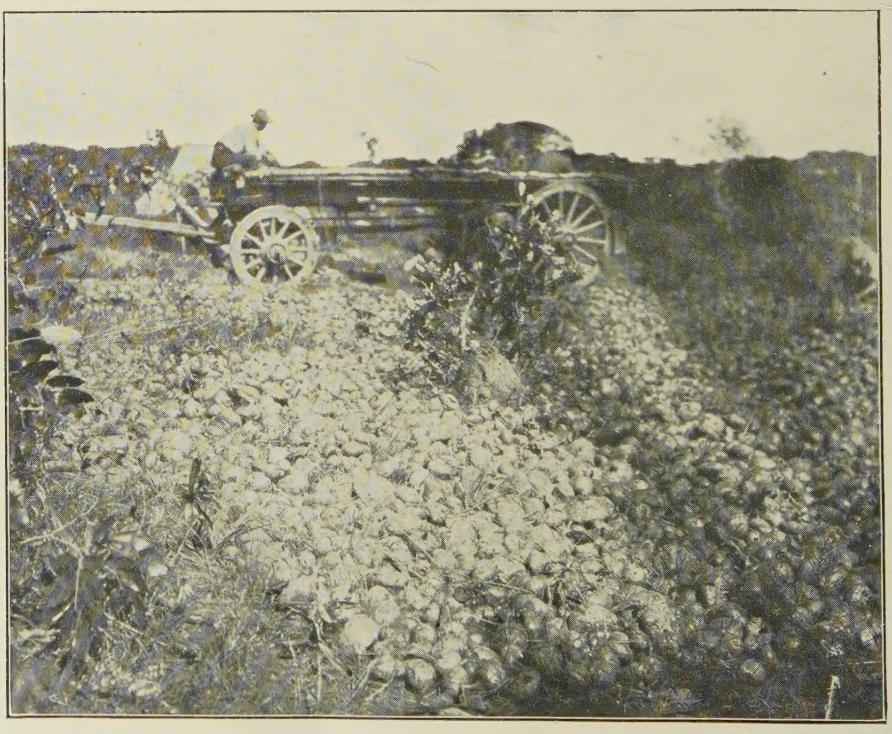

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